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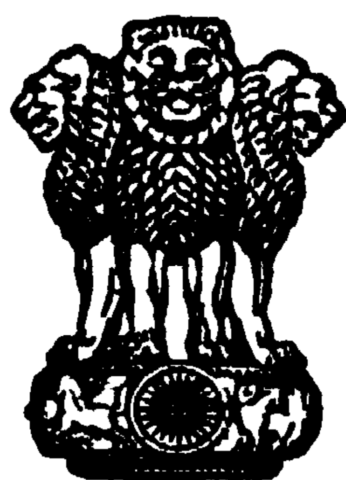
A REVIEW OF WORK

ON

INDIAN MEDICINAL PLANTS

Indian Council of Medical Research

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No. 30



A REVIEW OF WORK ON INDIAN MEDICINAL PLANTS

(Including Indigenous Drugs & Poisonous Plants)

By

Bt.-Colonel R. N. CHOPRA

I. C. CHOPRA

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FOREWORD

The use of indigenous drugs for the alleviation of human suffering is of considerable economic importance to our country With this end in view the Indian Research Fund Association, now the Indian Council of Medical Research, has been sponsoring extensive researches in indigenous drugs for over two decades The pioneering work in this field was done by Colonel Ram Nath Chopra at the School of Tropical Medicine, Calcutta and it may be said that we owe to him and to his students such knowledge as we today possess about the indigenous drugs of India A review of the work done in this field was published by the Indian Research Fund Association in 1939. This review was greatly in demand. The Council therefore decided that it was essential to bring the subject up to date and requested Colonel Ram Nath Chopra to undertake the task. That he has done it very ably will be apparent from a perusal of the book. It gives in simple and non-technical language a brief account of the indigenous drugs so far investigated in India The review should therefore be useful not only to practitioners of the indigenous systems of medicine in the country but also to scientists and to the lay public as well It will indicate to the scientists which drugs require further investigation. The bibliography given at the end is a comprehensive one which, apart from its scientific value, will show the extent of interest which scientists both in India and abroad have taken in this subject

Much yet remains to be done and many more drugs will have to be investigated scientifically by the application of modern methods of botanical, chemical, pharmacological and clinical research. I would, however, like to congratulate Colonel Ram Nath Chopra and his collaborators for their painstaking labour and for putting this material in such a concise and interesting form.

AMRIT KAUR,

September 16, 1954. *Minister for Health, India.*

PREFACE

For many years past, the Indian Council of Medical Research, formerly Indian Research Fund Association, has given large grants to research workers all over India for the study of Indian Indigenous Drugs In fact it was this body which was chiefly responsible for initiating work on this subject of great economic importance to India. The senior author was one of the first recipients of these grants when he was Professor of Pharmacology at the Calcutta School of Tropical Medicine and Medical College, Calcutta As Professor at the former Institution, one of the duties laid down for him, was the study of Indian Indigenous Drugs Financial resources from the School itself for this work were very limited then and it was the generous grants given by the Indian Council of Medical Research, extending over a period of more than three decades, both at the School and later at the Drugs Research Laboratory, Kashmir which enabled him and his co-workers to carry out screening studies of a large number of indigenous drugs Considerable financial help was also received later from Indian Council of Agricultural Research and the Council of Scientific and Industrial Research

In 1938 the senior author was asked to write a review of the work done on Indigenous Drugs under the Council upto that time, in simple non-technical language and a brochure was published in 1939 Large demand came from the public for this pamphlet and the edition was soon exhausted In 1953 he was again requested to write a review of the work on Indian Indigenous Drugs, but this time it was not to be limited to work done under the Council but was also to include work done by other independent investigators A thorough study of the whole literature on the subject was, therefore, undertaken by the present authors It transpired that the work on Indigenous Drugs was being chiefly directed in the channel of investigation of Indian Medicinal Plants Hence the change in the title of the present edition

The general arrangement of the subject matter in the brochure of 1939 has been again adopted Brief summaries of the work done on various drugs have been given in "telegraphic language". A comprehensive bibliography has been given, arranged subject wise and with full titles of papers Lists of plants used in the treatment of various diseases in the indigenous systems of medicines have also been given after a careful analysis of the literature.

It is hoped that this review will be read by those interested in indigenous drugs and their practical use for alleviation of human ailments As the descriptions are given in simple non-technical language and common vernacular names have been included, the present volume will be of interest not only to research workers but also to the public in general. The bibliography of nearly two thousand publications on the subject, collection of which has involved immense labour, will we trust, be useful to research workers and others.

In writing the present volume we wish to gratefully acknowledge the assistance we have received at every stage from Mr K L Handa who has helped in collecting references from literature and has checked up the chemical data. Messrs. L D. Kapoor and B K Abrol have checked up botanical terms and synonomy and Dr Kartar Singh Pharmacological Assistant in Indigenous Drugs Enquiry has rendered valuable assistance

To the Governing Body of the Indian Council of Medical Research, its worthy President Rajkumari Amrit Kaur and its able Secretary Dr C G Pandit, the authors are grateful for the generous grants for work on Indigenous Drugs These grants are being continued even now and are enabling the authors to carry on the work at the Drug Research Laboratory

Finances were also kindly provided by the Council for the preparation of the manuscript and the printing of this volume.

Drug Research Laboratory,
Jammu April, 1954

R. N. CHOPRA
I C. CHOPRA

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INTRODUCTION

The Indian Materia Medica, including the common household remedies at present includes about 2,000 different drugs Many of these are in actual use in different parts of India Of this number approximately two hundred are of mineral origin, about two hundred are of animal origin and the remainder are of vegetable origin The mineral drugs are mostly compounds whose chemical composition is generally known and whose actions are in most cases not difficult to understand The drugs of animal origin are a very varied assortment, few of which have been shown to have any rational usage The study of indigenous drugs, therefore, chiefly means a study of Indian medicinal and allied plants in which there is a vast and very rich field for investigation

Climate and topography The extreme variability that India presents in its meteorological and climatic conditions as also in its topographical features is perhaps unrivalled in the world The tremendous range of variation of temperature from 126°F in summer in desert areas to minus 46°F in winter in Dras in Kashmir, and the prevalence of arctic conditions throughout the year in some of the Himalayan ranges are well known The annual rainfall varies from 430 inches at Cherrapunji in the hills of Assam to less than 5 inches per annum in the desert areas of Rajputana The air is saturated with moisture in the coastal districts and in the hills during the south-west monsoon and there are periods of practically zero relative humidity in the dry weather These are some of the interesting contrasts presented by this vast country in which we live.

No less striking are its physical features It has the most massive and the loftiest range of mountains in the world, the Himalayas There are also lower hills and plateaus, extensive rich alluvial plains, sandy wastes and deserts, hills, streams, mighty rivers with their extensive deltaic and estuarine systems, numerous lakes, canals, ponds, tanks and extensive marshy tracts, sandy or rocky coasts spread over an area of more than a million and half square miles The country is in fact an epitome of almost all climates, seasons, and soils of the world Under these conditions it is not surprising that India possesses one of the richest and certainly the most varied flora of any area of similar size on the surface of the globe

Features of Indian Vegetation Roughly speaking, one-fifth of the Indian sub-continent is occupied by forests of different kinds There are ever-green forests occupying the west coast of the peninsula up to the ridges of the Western mountain chain, and the lower slopes of the

Note .— This work was initiated by the Indian Council of Medical Research formerly Indian Research Fund Association.

Eastern Himalayas, with their magnificent and majestic trees, the 'sky scrapers' many centuries old A large part of the peninsula is covered by the deciduous type of the forests which are very valuable to the country There are the dry forests of Rajputana and the Punjab which are also spread over a large area of Indian States There is very little vegetation of any kind in the Great Indian Desert itself

Many tidal creeks and backwaters along the coasts of India, chiefly the deltas of rivers, such as the Sunderbans are covered with another type of evergreen forest, the tidal or littoral, where many plants send up from their underground roots a number of aerial roots for respiration The massive chain of the Himalayas with its tropical, temperate and alpine flora presents unique features The eastern Himalayan flora differs remarkably from the western in several respects in addition to the disappearance of the tropical type as the extreme north-west is reached It is in this chain that the highest limit of vegetable life on earth has been recorded The tree limit in the Western Himalayas corresponds roughly with the snow-line, i e 12 000 ft. above sea level, above which a variety of beautifully coloured flowers flourish Aquatic or semi-aquatic types of vegetation are found in the tanks, jhils, ponds, water courses and swamps all over India, particularly in Bengal Lastly, there are areas in the plains, as well as in the hills, especially in the former, which have, through the influence of man in search of more and more agriculturally exploitable land, lost much of their original characters Another feature of the Indian vegetation is that whereas in one season of the year, vast areas in the plains of India are the scene of plenty for man and animals, in another they become a dreary brown sunburnt waste where herbivores starve by the thousands and where it passes human understanding how any creature dependent on plant life can survive the dry season

Relationship to other floras The Indian flora is closely related to that of some other countries, and it is interesting to remark that none of families of flowering plants is peculiar to this country There is a very great preponderance of those genera and species which are also found in the adjacent countries Malayan, Burmese and Chinese genera are specially well represented in Eastern India Next in order come the European and Middle East flora which are particularly strongly represented in Western India Of the typically European elements there are twice as many in the Western as in the Eastern Himalayas Nearly 600 European genera are represented in India, many of them by a single species, and the Middle Eastern element is certainly, as is only to be expected, no less prominent African, Australian and American elements follow these in decreasing proportions, the African flora being more noticeable in Western India Recently there has been an influx of American species with their remarkable tendency to spread Tibetan and Siberian floras only reach India in the alpine regions of the Himalayas, while Chinese and Japanese elements are strongly represented in its temperate belts All these factors tend to make the Indian flora very rich and cosmopolitan and full of possibilities of economic importance

CHAPTER II

MEDICINAL PLANTS OF INDIA

India abounds in all kinds of food plants, spices, perfumes, timber, fibres, gums, etc which have been known all over the world from ancient times There are more than about 700 important fodder plants including about 260 species of valuable fodder grasses It is not surprising, therefore, that plants containing active and medicinal principles also grow abundantly within its bounds More than 2,000 plants, out of a total of about 11,000 species found in India, are alleged to have medicinal properties of some description or other and have been enumerated in the literature of indigenous medicine Nearly three-fourths of the drugs mentioned in the British and other Pharmacopoeias grow here in a state of nature and others can be easily grown Indeed, this country is a veritable emporium of drugs The families to which the larger numbers of medicinal plants belong are Leguminosæ, Compositæ Labiatæ, Euphorbiaceæ, Rubiaceæ, Rosaceæ, Gramineæ, Liliaceæ, Rutaceæ, Ranunculacæ, Umbelliferæ, Cucurbitaceæ, Solanaceæ, Apocynaceæ and Malvaceæ

It stands to reason that all these 2,000 odd plants cannot possess the wonderful virtues attributed to them, but it is believed that there are some of these which might rightly deserve the reputation they have earned as cures In order to determine what these were and what medicinal properties they possessed the study of these plants was begun in the early part of the last century

The early studies were mainly confined to collection of available data from the literature of indigenous medicine as well as getting information about their popular use as household remedies by the people A rough survey with regard to the occurrence of these plants in different parts of the country was undertaken by various workers and in some cases chemical analysis of a preliminary nature was also carried out Modern medicine however, is intimately related to chemistry and detailed examinations of active principles of plants and other products form an essential part of it Experimental work on the pharmacological side to determine the action of these active principles needs laboratories well equipped with modern apparatus and appliances which were not available in those days Work on medicinal plants on modern scientific lines was thus started in the early part of this century with the main objective of making India self-sufficient and self-supporting by enabling her to utilize drugs produced in the country and by manufacturing them in a form suitable for administration There are a number of drugs of established therapeutic value which are in use in the pharmacopoeias of different countries Many of these grow wild and some in great profusion in different parts of India and a certain number are even cultivated If these resources could be developed and utilized and the finished products manufactured, treatment of many diseases could be brought within the means of the Indian masses whose economic condition is unfortunately of a very low order

A number of important drug plants extensively used by the medical profession, however, are neither found growing in a state of

nature nor have so far been cultivated in India. Cultivation of such plants is very important from an economic point of view, and scientific research in this direction, as is being carried out in other countries, would be very fruitful It is a matter of regret that India is still importing quantities of crude drugs in spite of the fact that practically every conceivable pharmacopoeial drug can be grown within her bounds. The history of the cultivation of cinchona, eucalyptus, digitalis, etc. in India clearly shows that the cultivation of medicinal plants is pregnant with rich possibilities if taken up on proper lines It is gratifying to note that in recent years a growing and increasing interest is now being taken in this direction

Remedies used in Indigenous Medicine. The second objective has been to discover remedies from the claims of Ayurvedic, Tibbi and other indigenous resources suitable for employment by exponents of Wetsern medicine This is only possible if these are shown to have effective active principles in them Since the period of decay and resuscitation of old systems of Indian medicine, knowledge of many of the effective remedies was lost while a number of uncertain ones crept in Belief in their efficacy originates in some cases from the teachings of the ancient commentators and is based on clinical data In others, however, there is no basis whatever The object of research initiated by the Indian Council of Medical Research (formerly Indian Research Fund Association) was to determine which of these plants had the therapeutic efficacy claimed and which had not Since this work was started about thirty years ago, several hundred medicinal plants have been partially screened and investigated by workers in this country Some of these have been shown to be of great practical utility and have been actually brought into use Many of the others were found to have effective medicinal properties and could be brought as cheaper substitutes for pharmacopoeial and Extra pharmacopoeial drugs A large number of others were found to be entirely useless. Much, however, remains to be done and hundreds of plants with alleged medicinal properties, remain to be investigated

Collection of drugs A few words may be said here with regard to the time of collection of drugs, for purposes of examination This should be done at the proper time when the plant matures and the active principles are at their maximum If this is not done even effective drugs may be found to have no activity During the last twenty five years several drugs of Indian origin have assumed considerable importance from the point of view of foreign trade Many firms of drug manufacturers in this country also use the locally produced raw materials for the manufacture of the finished products It is a matter of very great concern, therefore, that the crude drugs collected locally are often not up to the required standard and this has resulted in considerable economic loss Fortunately, this state of affairs is being gradually rectified It must be stated however, that collection of drugs is not so simple a matter as most people seem to imagine Collectors of medicinal drugs growing in a state of nature, and the present and prospective cultivators should bear in mind that there are certain factors which have to be considered in order to obtain standard medicinal products There is a good deal of variation in the active principles in the different parts of a plant and in different seasons in the same part of the plant Even the same part and at the same time of the year shows remarkable variations

in the contents of its active principles For example, the young and the old leaves of a plant and unopened and opened flowers differ materially despite the fact that they are collected from the same plant and during the same season.

The soil also has an important influence on the active principles of plants It has often been observed that plants collected at the proper time, when the active principles have reached maturity and are at their maximum, give very effective results while the same plants when collected under other conditions are utterly useless Conditions for the collection of drugs in the case of plants under cultivation are more favourable and strict control over various factors can be exercised with greater ease than is the case with plants growing in a state of nature. It has, however, to be admitted that ideal conditions for the collection of even many of the common and important medicinal plants are not known with precision and research is urgently needed to determine the time when the active principles are at their maximum under the environments existing in this country, as was done by the Dutch in Java in the case of cinchona If this could be systematically carried out, India could supply itself and other countries with medicinal 'herbs'

CHAPTER III

INDIAN INDIGENOUS DRUGS

Main lines of basic research Having given a general account of the potentialities of this country with regard to medicinal plants, we will now briefly describe some of the important lines of basic research taken up by workers in this connection The first of these is study of Indigenous Drugs of India

Indigenous Drugs of India It is desirable to point out at the outset that the term 'Indigenous Drugs' has been used, for the purposes of research in its widest sense so as to include within its scope not merely those drugs which were originally the natives of India, but also those which have been introduced from outside and have become completely naturalised Drugs which are cultivated in India, whether used in the indigenous system of medicine or in the pharmacopoeias of various western countries, have also been brought within the purview of this investigation The term also includes locally manufactured preparations of mineral and animal origin which are used in medicine as practised in India

Historical The study of Indian indigenous drugs was first begun in the early part of the last century and it was then confined chiefly to the collection of available information with regard to various medicinal plants growing in different parts of the country The earliest contributions were from the writings of Sir William Jones whose memoir entitled "*Botanical Observations on Select Plants*", is well known This was followed in 1810 by John Fleming's "*Catalogue of Medicinal Plants*", Ainslie's "*Materia Medica of Hindustan*" in 1813, and Roxburgh's "*Flora Indica*" in 1820 In 1844 O Shaughnessys published his "*Bengal Pharmacopoeia*" which was the first book of its kind which dealt exclusively with the properties and uses of the medicinal plants used in Bengal In 1868 a "*Pharmacopoeia of India*" was published under the able editorship of Waring It signalized a new epoch in establishing and recording the value of indigenous medicinal products on modern lines The more important drugs were officially recognised with a view to their eventual adoption in the British Pharmacopoeia As a large number of the drugs, especially those in local use by practitioners and as household remedies, were not included in this work, Mohideen Sheriff published his "*Supplement to the Pharmacopoeia*" in the year 1869 He is also the author of "Materia Medica of Madras" which was edited and published after his death by Hooper U C Dutt's translation of Sanskrit Materia Medica brought into prominence the drugs used in the old Hindu Medicine even now largely practised in India Then Fluckiger's and Hanbury's "*Pharmacographia and Materia Medica of Western India*" 1883 was published These were followed by the publication of that very comprehensive book on the Indian Medicinal plants the "*Pharmacographia Indica*" in 1885 under the joint editorship of Warden and Hooper This treatise contains a mass of information regarding the uses of the indigenous materia medica in the Eastern and Western medicine The most elaborate work of all is "*A Dictionary of the Economic Products of India*" published in 1895 by Sir George Watt, the Reporter on the Economic Products to the Government of India. This monumental work, compiled with the help of a large team of workers, refers

to all the previous work on medicinal plants and other plants of economic importance Its pages are full of information of every description regarding the use of different barks, roots, flowers, leaves and woods for different medicinal and other purposes Works published still later such as Kanai Lal Dey's "*Indigenous Drugs of India*" and Kirtikar and Basu's "*Indian Medicinal Plants*" are largely summaries and compilations from the above mentioned literature in a more systematised and elaborated form In the last named book, plates illustrating various important medicinal herbs are given which greatly help the reader in differentiating them from plants with which they are apt to be confused

The literature mentioned above is very valuable, as it contains not only information from Ayurvedic and Tibbi sources, but also gives the results of personal observations and experiences of some of the writers There is no doubt that a considerable amount of botanical investigation into the scientific names of many medicinal plants was accomplished More, however, remained to be done in the case of a large number of plants to clear up many points with respect to their exact botanical sources Many drugs that had escaped the previous investigators require to be explored in all their details

Admirable as all these attempts were, the pharmacology of most of the indigenous remedies remained an unexplored field till recent years The reason for this is not far to seek Investigations of this nature require a considerable outlay of money in the form of well-equipped chemical and pharmacological laboratories, while a liberal staff of competent chemists and pharmacologists is another essential prerequisite Medicine we have observed is now intimately related to chemistry, and the ultimate solution of most problems, whether physiological or biological, rests on some physical or chemical basis This is forcibly presented to us in the study of the action of drugs The importance of the cooperation of chemists at every stage of research work can only be realised by the workers themselves If satisfactory results have to be achieved and if the work is to be carried out on the same standard as in other civilised countries, the cooperation of competent chemists with experience is the first essential

It must be pointed out that the time and labour required to work out the chemical composition of a single drug are enormous This may be judged from the fact that it would take an experienced chemists several months, perhaps a year or more, to isolate in a pure state and roughly describe the nature of the different chemical constituents of a single crude drug The determination of the chemical constitution of the active principles concerned would take a considerably longer time. The isolation of a sufficient quantity of the active principles and the testing of them pharmacologically would occupy many months The magnitude of the task of working out all the drugs used in the indigenous systems of medicine in detail transcends all imagination There is such an enormous scope for research in this field, and so little has been done, that it is impossible for any one individual or any one institution to cope with it adequately. The cooperation and intimate association of a large number of sincere and devoted workers of ability is needed to find the truth This is now being gradually done. Chairs in Pharmacology have been founded by the various Universities and Medical Colleges and facilities for research work on modern scientific lines are now being made increasingly more available.

As the action of these drugs or their active principles can only be established by a careful chemical, pharmacological and clinical study, the investigation in all the three aspects should be carried on side by side. The experimental work on the pharmacological side can be done only in laboratories well equipped with all modern appliances The first laboratory of its kind established in this country was at the School of Tropical Medicine, Calcutta in 1921 One of the main duties of the Professor of Pharmacology laid down was investigation of the indigenous drugs on scientific lines The chemical department of this institution had a small team of chemists who worked out the chemical composition of drugs, isolated the active principles and handed them to the pharmacologist for determination of their action on the animal organism The clinical testing of the drug was made possible by the Carmichael Hospital for Tropical Diseases a research hospital attached to this institution In this way it was found possible to go through a number of drugs in all the varied phases of their investigation, i.e. from the isolation of their active principles to the testing of their action on animals and finally to the making of suitable preparations for trial on patients, and for recording the results of therapeutic trials.

The staff of the Departments of Pharmacology and Chemistry of this institution was only a nucleus to start this work It was wholly inadequate to deal with such an immense task in addition to its ordinary duties of post-graduate teaching Although a modest beginning was made in 1921 when the School started functioning, it was not really till 1926, when the Indian Research Fund Association, now known as the Indian Council of Medical Research, gave a grant to develop this work Investigations were then taken up in right earnest and on proper systematic lines. During the years that followed, the importance of this work was appreciated with greater emphasis and the grants were considerably increased It was realised by this body that this was the only effective reply to attempts at the wholesale revival of the indigenous system of medicine which were then in evidence In 1935 the Imperial Council of Agricultural Research (now Indian Council of Agricultural Research), appreciating the importance of basic research of this type which was being done gave a grant for the investigation of the closely allied group of Poisonous Plants and Food Poisons of India which are such a menace to man and live-stock in this country. By this grant the research facilities for work on indigenous drugs were also further augmented and certain deficiencies which existed in the technical staff were made good An efficient Botanical Unit was thus provided, the want of which had been very keenly felt in connection with the research work on medicinal plants

With all these facilities made available it was possible to undertake the study of a large number of drugs in all the varied phases of their investigation i e., from the isolation of their active principles to the testing of their action on animals and finally making suitable preparations for trials on patients and for recording results of therapeutic trials.

During the three decades that have followed, the research work on indigenous drugs has received considerable encouragement and has made satisfactory progress. The example of the Indian Council of Medical Research and Indian Council of Agricultural Research was followed by the Council of Scientific & Industrial Research. This Council

gave very generous grants to various Medical Institutions and other research bodies for this work. It also established in 1950, the Central Drug Research Institute at Lucknow as one of the eleven major National Laboratories of India One whole division of this great Institution is devoted entirely to the study of Indian Indigenous Drugs With the dawn of Independence, therefore, this research has been put on a sound and firm basis Much has been accomplished, in the study of Indian Medicinal Plants on systematic and scientific lines, though much more remains to be done. A brief review of this work will be found in the following pages.

It is obvious from what has been stated above that the Indian Council of Medical Research with its predecessor the Indian Research Fund Association were the pioneers in encouraging the study of Indian Indigenous Drugs on scientific lines It was the example of this body which stimulated interest on this important subject of vital importance to the country.

CHAPTER IV

BASIC REQUIREMENTS FOR STUDY OF INDIGENOUS DRUGS

We have said above that detailed study of Indigenous Drugs is not a one man job It needs close collaboration and association of scientific workers in different allied subjects The prerequisites for the work to be done properly on scientific lines are —

1. A Botanical Unit This Unit should consist of experienced botanists and technicians They help not only in the collection and identification of genuine drugs, but also in carrying out a survey of the medicinal and poisonous plants growing in different parts of the country The importance of this section must not be under-rated, as on the correct identification of the drugs depends the utility and authenticity of the whole work In the early stages, when expert botanical help was not available, many mistakes were made in connection with the identity of medicinal plants, thereby causing much confusion and waste of effort An extensive herbarium of these plants is being gradually built up by our botanists This is a unique collection of its kind in India, and is rendering the correct identification of medicinal plants for any trained worker an easy matter

2 A Chemical Unit This should consist of a band of expert research chemists with special experience in plant chemistry They should be trained for work in different aspects of plant chemistry involving extraction and identification of active principles, such as alkaloids, glucosides, essential oils, neutral principles, antibiotics etc The medicinal or poisonous plants sent by different forest officers or collected by the botanists, are first dealt with in this department and an attempt is made to determine the active constituents that may be contained in them The preliminary chemical examination, the isolation of the different constituents which may have pharmacological action, their purification and elementary analysis all require considerable time, patience and skill It may be stated here, that the isolation of the active principles of plant constituents is not an easy task of a routine nature, as may perhaps be imagined Each plant has its own peculiar problems and difficulties which have to be solved This can only be done by chemists with considerable practical experience and technical skill Besides being engaged in the isolation and identification of active principles of plants, the chemical section is also required to assist in chemical and biochemical assays of different drugs, in the preparation of galenicals, extracts, etc. for purposes of clinical trial in the hospitals The work involved, therefore, is of a varied and comprehensive character Efficient teams of workers, have now been brought into existence after many years of training, and the analytical work is being considerably facilitated as more experience is being gained

3 A Pharmacological Unit. This is composed, preferably of medical men especially trained in the technique of experimental pharmacology, who work under the guidance of a pharmacologist with large practical experience of this type of work They test the different preparations or the purified active constituents isolated by the chemists by properly planned animal experimentation They also carry out biological assays, test the toxicity of drugs and suggest suitable doses for therapeutic trials. Here also experience assists a great deal in assessing the

value of the reactions produced in animal tissues by drugs under investigation and their practical application to therapeutics in man

4 A Clinical Unit. This section carries out testing of drugs on patients in the out-patients department and in the hospital This work is carried out under the direct guidance of experienced pharmacologists and clinicians It has often happened that drugs have been tried in a haphazard fashion by medical practitioners and wrong conclusions have been drawn The proper clinical evaluation of these drugs needs a well equipped hospital with a specially trained house staff of medical men and nurses, in which patients can be kept and watched for weeks and months if necessary The clinician in charge of such investigation should also have experience of this type of work which needs considerable patience and sound judgment

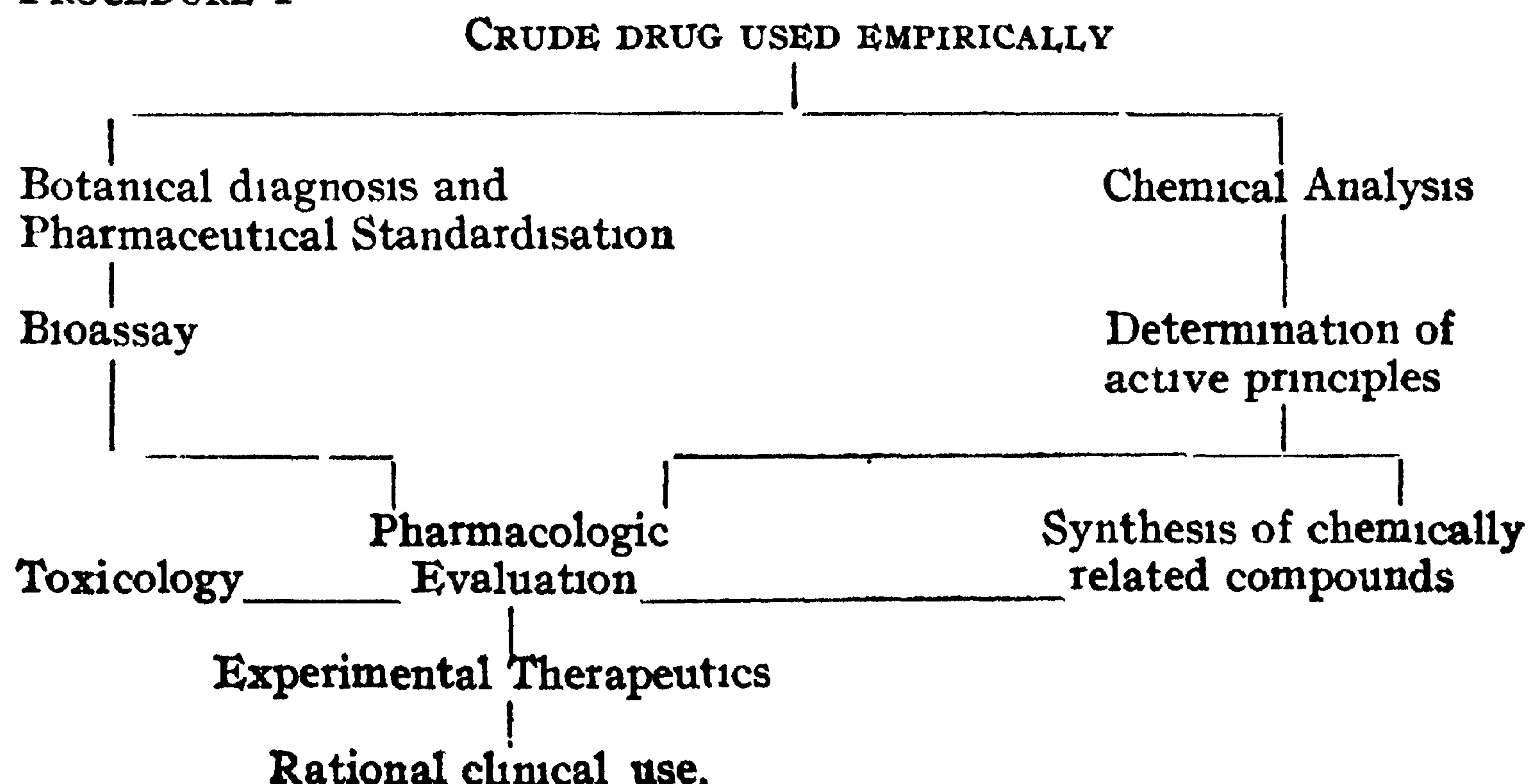
The existence of such teams all working in close cooperation, makes it possible to carry out this type of work on proper systematic lines. Research work of this nature started in institutions or university laboratories is often cut short at an early stage as the workers have to depend on institutions such as Hospitals for trials Again some of the universities and colleges do not possess properly equipped laboratories for pharmacological studies The procurement of all these facilities is expensive and make this work difficult If such organisations as Indian Council of Medical Research, Indian Council of Agricultural Research and Council of Scientific & Industrial Research had not come forward with generous grants, it would not have been possible to make any headway

It will thus be seen that from the stage of empirical knowledge available of a crude drug to bring it to its rational usage in modern medicine, it must pass through the following stages —

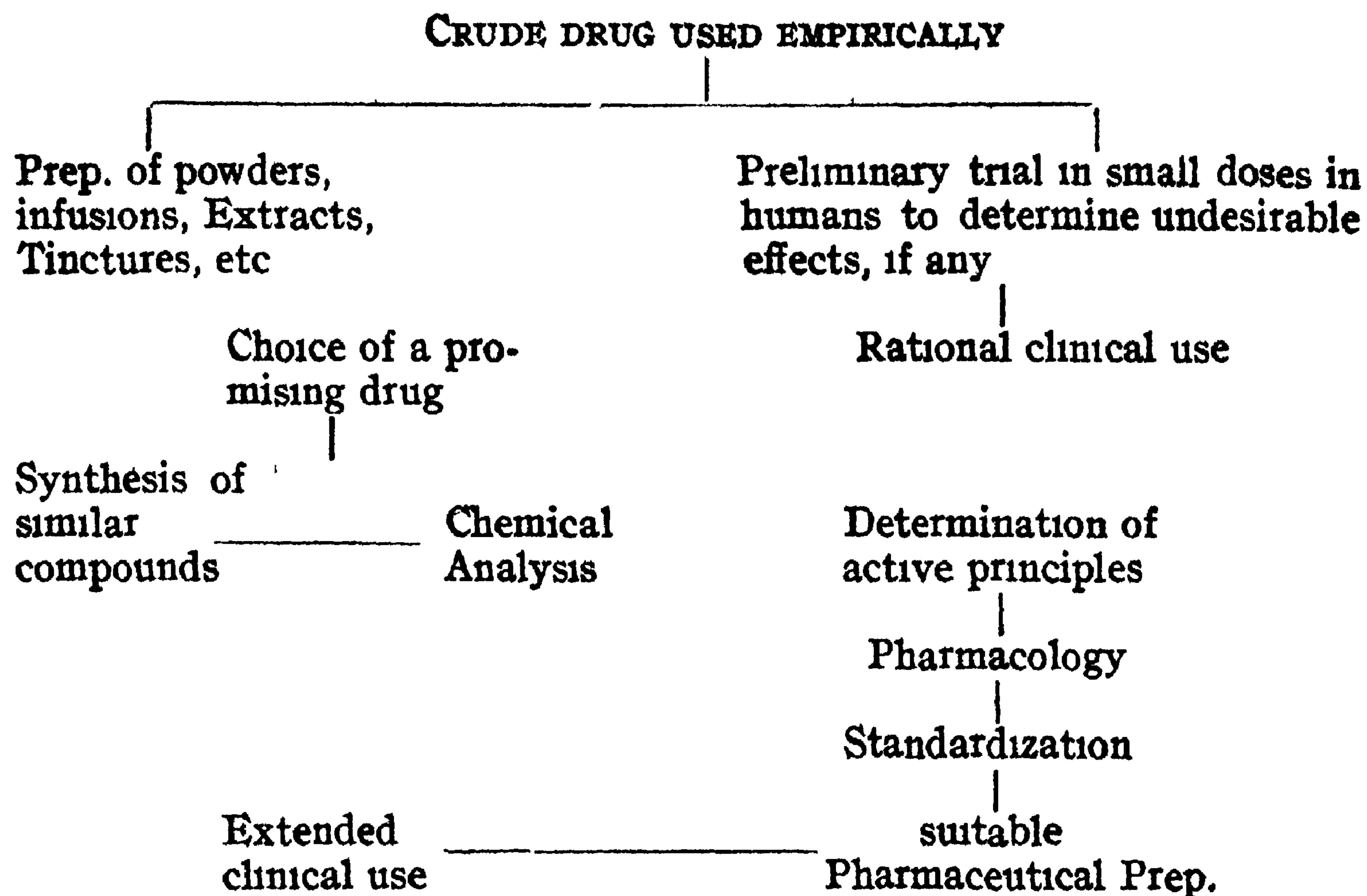
(1) Botanical identification (2) Chemical examination and isolation of active principles (3) Determination of their pharmacological action and toxic effects (4) Chemotherapeutic studies in animals. (5) Clinical trials in man

In case of well-known drugs of established value in indigenous medicine, it may some time be convenient to start with clinical trials first and proceed to analysis and laboratory tests afterwards A schematic idea of the work is given below —

PROCEDURE I



PROCEDURE 2



In whatever way the investigation is carried out on an indigenous drug, the work is time-consuming and can only be done by team-work of several groups of scientists each expert in his own field. The work should be co-ordinated by a medical scientist of experience who can draw logical conclusions from the data obtained. Haphazard approaches to this work have led to wrong conclusions and much confusion.

CHAPTER V

SCOPE OF WORK ON INDIGENOUS DRUGS

Work on indigenous drugs on modern scientific lines was initiated by the senior author when he was appointed Professor of Pharmacology at the School of Tropical Medicine, Calcutta with the following main objects in view :

1. To make India self-supporting by enabling her to utilise the drugs produced in the country, by manufacturing them in a form suitable for administration
2. To discover remedies from the claims of Ayurvedic, Tibbi and other indigenous sources suitable to be employed by the exponents of Western medicine
3. To discover the means of effecting economy, so that these remedies might fall within the means of the great masses in India whose economic condition is very low.
4. To prepare an Indian Pharmacopoeia including indigenous remedies of value

(1) TO MAKE INDIA SELF-SUPPORTING SO FAR AS DRUGS AND THEIR PREPARATIONS ARE CONCERNED

Pharmacopoeial and Allied Drugs The first proposition is likely to lead to great results, because a large number of drugs which grow in this country are known both to Eastern and Western medicine and the properties and actions in many cases are also known The research here has been diverted into two main channels Firstly, there are many drugs of established therapeutic value which are in use in the pharmacopoeias of different countries The majority of these grow wild and in abundance in many parts of India and a certain number are even cultivated Some of these are collected and exported, though only a small fraction of the quantity produced, to foreign countries and come back to us in the form of standardised pharmaceutical preparations and active principles in pure condition, probably at a price many times that of the original crude product. A host of others grow, mature and eventually die without being put to any practical use whatsoever. There are numerous examples which have been dealt with in detail elsewhere. A brief description of those investigated is given hereafter in this review with short notes with regard to the work done

Besides these, there are a number of pharmacopoeial drugs which are widely used by the medical profession, but which do not naturally grow in this country They thrive, however, when they are cultivated under proper conditions in suitable parts of the country. Examples of such drugs are numerous but a few of the important ones such as digitalis, ipecacuanha, eucalyptus, cinchona, jalap, etc., may be cited. They were introduced into India many years ago and are doing well. On account of the great demand for these drugs in medical practice, their production

in this country is of great economic importance. India, we have stated, possesses most wonderful variability so far as the temperature and general climatic conditions are concerned, and every conceivable drug ranging from those growing in the hotest tropical and damp climates to those growing in dry, temperate and very cold climates can be grown and acclimatised in some part or other. From the geological point of view also every grade of soil from alluvial deposits to hard rocky formation and sandy deserts are met with Professor Greenish of the London School of Pharmacy rightly said, "India owing to the remarkable variations she possesses of climate, altitude and soil, is in a position to produce successfully every variety of medicinal herb required by Europe".

It should be remembered, however, that the soil, the season and the gathering time are some of the important variable factors with plants, and it can hardly be expected that the amount of active constituents would be constant under all conditions In some cases the quality is good and constant, but in the majority of instances the percentage composition of active principles has to be determined by careful methods of chemical and biological assay, to show that these remedies, growing in a state of nature, are as good in quality as those required by the standards laid down in the Pharmacopoeias If they do not come up to the required standard, the best method of bringing them into general use by improving the quality of the active principles by suitable cultivation, in parts of the country where this can be done economically, has to be determined

The work done so far in connection with these two groups of plants, has been responsible for bringing into use a large number of crude drugs, which were formerly imported from foreign countries by the drug manufacturing industry, by showing that the active principles of many of the indigenous plants came up to the standards laid down by the pharmacopœia.

Secondly, a large number of plants grow in India which, though not exactly the same, have properties and actions similar to the imported and often expensive remedies and would form excellent substitutes Not infrequently there are some closely allied species which are pharmacologically just as active The properties of these plants are being worked out on scientific lines and they are being brought into use Some examples may be cited here *Colchicum luteum* growing on the slopes of the western temperate Himalayas has been shown to be an excellent substitute for the official *C autumnale*. *Scilla indica* grows extensively on the sea-coast and on the drier hills of the lower Himalayas and the Salt Range and is being used as a substitute for *S. maritima* *Ferula narthex*, growing in Kashmir, yields a gum resin resembling asafœtida The properties of *Picrasma quassioides* and *Gentiana kurroo* resemble those of *Picrasma excelsa* and *Gentiana lutea* which are official in the British Pharmacopoeia. Many other examples could be cited

In both these groups there is a large field for research and development and considerable work has been done in connection with recognition of their active ingredients, determination of their percentage composition and establishing their pharmacological action. Pharmaceutical preparations are now manufactured from these indigenous products to the immense advantage of the country

(2) To discover remedies from the claims of Ayurvedic, Tibbi, adn other indigenous sources.

The Drugs used in the Indigenous Medicine. The second proposition of popularising and introducing new drugs to Western medicine is a more difficult one. It is believed that out of the very large number of drugs used in the indigenous systems of medicine for centuries past, and still in use, there must be some at least which might deserve the reputation they have earned as cures. Since the period of decay and recompilation of old Indian systems of medicine, many of the effective remedies have been lost and a number of uncertain ones have come in The result is that in the indigenous systems, at the present time, almost every plant and shrub growing in the country has ascribed to it some medicinal virtue These beliefs in some cases originate from the teachings of the ancient commentators and are based on clinical data, but in others have no foundation whatever Their introduction was empirical and often a drug was used simply because a single case appeared to have derived some benefit from it In this way remedies have multiplied without proof but by belief and as they hail from all parts of India, no one seems to have a correct notion about their uses and properties. The employment of a large number of them would thus appear to have been based on empirical evidence handed down from generation to generation A thorough and complete research into all these drugs would constitute the life long work of innumerable chemists, pharmacologists and physicians For practical purposes the method adopted by workers has been to make use of the experience of Vaids, Hakims and others, and to take up for investigation those drugs which have a great local reputation before touching the less known remedies Besides, many of these drugs have been clinically tried by medical men practising Western medicine, who have expressed their opinion regarding their efficacy, this has also been helpful in the selection of drugs to be investigated. In this way a large number of commonly used drugs have been scrutinised.

(3). How to effect economy and bring the treatment within the means of the masses.

The third proposition relates to the devising of expedients for effecting economy, so that these remedies may reach the masses This is only possible if the price of the drugs can be considerably reduced, for in a poor country like India, there are millions of people who cannot afford any kind of treatment, whether cheap or expensive, and have consequently to depend upon charitable medical relief institutions The cost of drugs is so heavy that most of these institutions, which have only a limited annual budget for drugs, are not able to cope with the demand for such common and essential drugs as quinine, castor oil, magnesia, etc., to say nothing of the expensive medicines which are sometimes necessary and even indispensable.

The only way in which drugs can be cheapened and brought within the means of the masses is to utilise the local resources and substitute the indigenous products for the more expensive imported preparations of Western medicine. This can be done by encouraging the production, collection and manufacture of the local materia medica by preparing pharmaceutical preparations in a systematic manner. By local production and substitution of equally potent drugs of Indian origin for the imported drugs, the cost of treatment can be considerably reduced.

We have already made a reference to some of these remedies and the possibilities of their development. Their active principles are now being isolated, and standardised preparations such as tinctures, extracts, powders, etc , are being prepared by a number of reliable manufacturers If this aspect is further developed it will be possible to affect large scale economy

It is a matter of satisfaction to note that a great deal has been done towards the development of a drug manufacturing industry in India, and towards encouraging the use of raw material produced in the country for the preparation of galenical and other preparations The price of preparations has already come down considerably during recent years and by further development of this industry it is hoped that there will be further reduction in prices The factors which were militating against the bringing down of the prices of medicinal preparations to the level of the low economic conditions of the masses were fully investigated by the Drugs Enquiry Committee (1930-31). These were firstly, the excise duty on alcohol used for bonafide medicinal purposes by the manufacturers, and secondly the high railway freight for purposes of transportation of drugs from one part of the country to another Attention is being given to all these and drug industry in India is being put on a sound basis

(4). INDIAN PHARMACOPOEIA.

The fourth proposition of preparing a Pharmacopoeia is by no means an easy one. A national Pharmacopoeia is primarily meant to meet the claims and satisfy the needs of a particular group of physicians at a particular time. There must exist, and there does exist, a great difference not only between the Pharmacopoeias of various countries, but also between various editions of the same Pharmacopoeia.

The object of a Pharmacopoeia is, in the words of the founders of the United States Pharmocopoeia, 1820, "to select from among substances which have medicinal power those the utility of which is most fully established and best understood, and to form from them preparations and compositions in which their powers may be exerted to the greatest advantage."

The modern Pharmacopoeia is above all a book of standards. Its fundamental object and scope is, "to provide standards for the drugs and medicines of therapeutic usefulness or pharmaceutic necessity sufficiently used in medical practice; to lay down tests for the identity quality, and purity, to insure, as far as possible, uniformity in physical properties and active constituents " In other words, usage, rational usage and scientific usage are the basis of judgement.

The evidence placed before the Drug Enquiry Committee 1930-31 showed that India should have an official publication which would record what she recognizes as a trustworthy and approved materia medica upon which can be established modern food and drug acts, poison laws, systems of taxation, and the modernization of legal medicine Her best scientific men should be enlisted to shoulder the responsibility of working out India's own standards and to develop the necessary analytical laboratories, biological institutes and pharmaceutical schools It involves not only the development of machinery for the administration of laws based upon official standards, it means also finding an authoritative standard

which every doctor and pharmacist in India will hail as a real guide in every-day work

A consideration of what is said above will show that although the preparation of an Indian Pharmacopoeia is very desireable, a very large amount of work must necessarily be done before such a work can be prepared. The Drug Enquiry Committee 1930-31 carefully considered the question of the compilation of an Indian Pharmacopoeia and thought that the utility of such a work for the country cannot be overrated.

The pharmacopoeia which is in view ought to include the therapeutically active substances and, to find admission to it, a drug must be of known composition, of definite pharmacological action, and of well-established therapeutic use, and fully investigated for its toxicity and necessary standard for determining a safe maximum dose, with a chemical or biological standard The large mass which do not satisfy this condition should be left out. Necessary tests have to be developed for the protection of doctor, pharmacist, and patient India ought to set a standard of strength and purity for the material which is to appear on her markets.

This work should be on the lines of the British and the United States Pharmacopoeias including only drugs of known composition, of definite pharmacological action, of well-established therapeutic properties, with known toxicity and the necessary standards of chemical and biological assay for determining the safe maximum doses

The work which is being done on the Indian Indigenous Drugs is exactly the type of work which will eventually lead to the preparation of an Indian Pharmacopoeia But it is obvious that much more will have to be done before such an authoritative publication can be prepared. The Drug Control Laboratory at Calcutta and later the Central Drug Research Institute, Lucknow have helped greatly towards evolving standards suitable for this country A large number of drugs commonly used have been fully worked out, and the conditions above stated are being satisfied with regard to them

It is a matter of great satisfaction to note that work on these drugs has sufficiently advanced to lay the foundation of an *Indian Pharmacopoeia* As a first step towards it an *Indian Pharmacopoeia List* was prepared by the Committee set up by the Government of India under the auspices of Drugs Technical Advisory Board in 1947 This was published in 1949 and is an authoritative document laying down standards for Indian climatic and other conditions for drugs sufficiently worked up to be included in the List The Health Ministry then set up a Permanent Pharmacopoeia Committee This Committee has been at work since and with the help of number of sub-committees composed of experts from all parts of India has now practically completed the labour of compiling the first edition of Indian Pharmacopoeia which will be published in the near future The pioneering work done in connection with the preparation of Indian Pharmacopoeia by the Indian Council of Medical Research (formerly Indian Research Fund Association) cannot be overrated. As early as 1926 this body appreciated the importance of the study of Indigenous Drugs on scientific lines as a preliminary to compilation of an Indian Pharmacopoeia and started financing a number of investigations in this

connection with the object of working out of the indigenous drugs on scientific lines.

Recently an *Indian Pharmaceutical Codex* has been published under the auspices of Council of Scientific & Industrial Research by Dr B. Mukerji, Director, Central Drug Research Institute, Lucknow, which gives about 200 monographs and a similar number of formulary giving pharmacognostic, chemical, pharmcological and therapeutic data on indigenous drugs with their preparation and dosage for the medical and pharmaceutical professions.

CHAPTER VI

A RETROSPECT OF RESULTS ACHIEVED

During the period of three or four decades since this work was started, much has been accomplished though only the fringe of this vast problem has yet been touched A number of important medicinal plants commonly used by the Kabirajes, Hakims and as popular household remedies by the people have been investigated on modern scientific lines' The chemical composition of many plants has been determined, the pharmacological action of the active principles of a large number has been worked out by animal experimentation, and finally suitable preparations made from a number of drugs have been tested on patients in properly equipped hospitals It is only by such thorough investigations that the real merits of these drugs can be proved and a demand created for them not only in India but in other parts of the world This laborious work has brought into prominence the merits and qualities of certain drugs and it has been shown that they may prove to be valuable additions to the armamentarium of the medical man to relieve the sufferings of humanity, if brought into general use Such drugs unfortunately are not many A few examples may be cited here *Holarrhena antidysenterica* (Kurchi) has proved useful in the treatment of amoebic dysentery especially the chronic form, *Rauwolfia serpentina* has proved to be an effective sedative which brings down the blood pressure particularly the diastolic This plant has attracted much attention of the Pharmacologists and clinicians in Europe and America There are a number of others *Plantago ovata*—Isabgul is an excellent sedative in irritative conditions of the guts, *Adhatoda vasica* is a good expectorant; *Psoralea corylifolia* is useful in leucoderma, *Cissampelos pariera* is likely to be a useful smooth muscle relaxant, *Deamia extensa* as smooth muscle stimulant

A large number of those examined showed activity more or less the same as drugs already possessed by the pharmacopoeias These can be brought into use as cheaper indigenous substitutes Many others were effective enough to be used in the treatment of common minor ailments which form about 80% of total morbidity in this country A fourth group of drugs which though used in indigenous medicine were found to have little or no activity as judged by our standards. Many drugs of questionable value and doubtful utility crept into the indigenous systems during the period of decay

Full details of work done in this connection upto the end of 1953 will be found in the 2nd Edition of "*The Indigenous drugs of India*" which is a compendium of information with the regard to the whole subject of indigenous drugs and constitutes a leading work of reference. A Glossary of Indian Medicinal Plants is in the course of publication by the Council of Scientific & Industrial Research. In this book which has involved immense labour, brief reference has been made to scientific name of plants, their common vernacular names, the active principles contained,

Abbreviations used in description of Plants.

Afgh	..	Afghanistan
B	...	Bengali
Baluchi	...	Baluchistan
Baz	..	Bazar
Bhutia.	...	Bhutan and other Himalayan countries
Bo	...	Bombay
B P	...	British Pharmacopoeia
B P C	...	British Pharmaceutical Codex
Burm	.	Burmese
Dec	..	Deccan
H	..	Hindi
I P	...	Indian Pharmacopoeia
I P C.	...	Indian Pharmaceutical Codex
I P L.		Indian Pharmacopoeial List
K	..	Kanarese
Kash	...	Kashmiri
Kumaon	..	Kumaon Hills
M	...	Malayalum
Nep	...	Nepalese
P	..	Punjabi
Pers	..	Persian
S		Sanskrit
Singh	.	Singhalese
Santh.		Santhal
Vern		Vernacular

Abroma augusta Linn Devils cotton (Vern —H & B Ulatkambal Bo —Olaktambol) I P C

Grows wild in Uttar Pradesh, Sikkim, Khasia Hills and Assam Both root and bark are used as emmenagogue in menstrual disorders and as uterine tonic Fresh viscid sap is used in dysmenorrhea in doses of 30 grains a day An alkaloid 0 01%, a fixed oil, resins and water soluble basis have been found Preliminary investigations of the alkaloid and water soluble bases revealed no remarkable pharmacological activity No proper clinical trials have been carried out

Abrus precatorius Linn. (Indian or wild Liquorice root) (Vern —S & Bo —Gunja, H —Gaungchi, B – Kunch, M —Gundumani)

Grows wild in plains of India and Ceylon and along the Himalayas up to altitudes of 3,000 ft Seeds are used as tonic and aphrodisiac Roots and leaves contain glycyrhizin, an alkaloid abrine, a glycoside abralin and a fatty oil Preliminary investigations of the alkaloid revealed its marked poisonous properties No systematic study has been carried out with regard to its therapeutic efficacy

Aconitum (Vern —Bachnag)

A paste prepared from the root is used as a remedy for neuralgia and other painful affections The drug is used in the treatment of fever, rheumatism, cough, asthma and snake-bite

Aconitum balfourii Stapf (Vern -Nep -Gobari, Darmiya gobriya)

It is found in sub-alpine Himalayas from Gharwal to Nepal at altitudes of 12,000 ft to 14,000 ft. Root contains total alkaloids 1 2% of which pseudo-aconitine is 0.4%.

Aconitum chasmanthum Stapf. Indian Nepellus (Vern -Mohri, Kash -Banbalnag). I P. L & I P C

Grows in Western Himalayas of Kashmir at altitudes of 7,000 ft to 12,000 ft Root contains 4 3 per cent of total alkaloids, aconitine being the principal

Aconitum deinorrhizum Stapf (Vern -Safed bikh, Mohra, Maurabikh)

It is found throughout the Central Himalayas from Kumaon to Nepal and Upper Bushahr in Himachal Pradesh Roots contain total alkaloids 0 9 per cent of which pseudo-aconitine is 0 4 per cent.

Aconitum ferox Wall (Vern -S -Visha, H & B -Bish, Bo -Vachnag, M -Vashanavi)

It is found in Northern Himalayas, Nepal and Kashmir. Root is used as a remedy for neuralgia and rheumatism and as a sedative, antipyretic and diaphoretic

Aconitum heterophyllum Wall (Vern -Atis, S -Ativisha, H -Atis, B -Ataicha, M -Ati vadayam)

It grows in sub-alpine and alpine zones of the Himalayas It is used as a bitter tonic and febrifuge in the treatment of fevers, diarrhoea, dyspepsia, cough and as an aphrodisiac Roots contain alkaloids atisine 0 4 per cent , heteratisine and hetisin

Aconitum laciniatum Stapf (Vern - Kalo bikhmo),

Grows in the sub alpine and alpine Himalayas of Sikkim and Tibbet at altitudes of 10,000 to 14,000 ft.

Aconitum spicatum Stapf (Vern -Bikh, Kalo bikhoma donghi)

Grows in Nepal, Sikkim, Chumbi at altitudes of 10,000 to 12,000 ft It is used as a poison Roots contain 0 4 per cent of alkaloid named bikhaconitine

Aconitum violaceum Jacq (Vern -Tilia Kachnag)

Found in alpine zones of the Himalayas from Gilgit to Kumaon at altitudes of 10,000 to 15,000 ft The alkaloid aconitine is a cardiac irritant Locally it produces tingling followed by numbness Internally it slows the heart.

Acorus calamus Linn (The sweet flag) (Vern -H & B -Bach, Bo -Vaj, M.-Vashambu). I P C

Native of Europe and North America, but cultivated in India and Burma at altitudes of 3,000 to 6,000 ft Common in Manipur and Naga Hills. The rhizome is used as emetic, antispasmodic, carminative and expectorant. It is an old remedy against chronic, diarrhoeas Dried rhizome contains 1.5% of an essential oil, starch and tannin. No systematic pharmacological investigations have been carried out.

Actinodaphne hookeri Meissn (Vern.-Pichli, Bo -Pisa).

Grows in Sikkim and on the eastern and western Ghats. Infusion from leaves is used as a remedy for urinary disorders and oil from seeds is used as an external application in sprains of joints Bark contains a crystalline alkaloid named as actinodaphnine. Leaves contain amorphous salts and seeds an essential oil (1 0%), fat and a fixed oil No pharmacological or clinical works have been carried out

Adhatoda vasica Nees (Malabar nut tree. Vern -Arusha, S.-Vasaka, H. & B.-Adulsa, B.-Bakas, M Adhatodai) B. P C., I. P. C. & I. P. L.

Grows all over the plains of India and in the lower Himalayan ranges ascending to a height of 4,000 ft Leaves, roots and flowers are used as a remedy against chronic bronchitis, asthma and pthisis Juice of leaves is used in diarrhoea, dysentery and malarial fevers. It is also used locally as counter-irritant It contains an alkaloid vasicine and an essential oil The alkaloid vasicine has no very marked pharmacological action and produces only slight bronchodilation The essential oil acts as an expectorant. Fluid extract from leaves relieves coughs It is said to be effective in asthma and pulmonary tuberculosis An antibiotic principle having a powerful action on tubercle bacillus has been discovered.

Aegle marmelos Correa (Bael fruit Vern -S.-Sriphal, H, B. & Bo -Bael). B P C, I P C & I P L

Grows wild all over sub-Himalayan forests, in Bengal, South India and in Burma Root, bark, leaves and fruit are used to cure gastro-intestinal disorders Roots, bark and leaves contain reducing sugars and tannin and fruit contains marmelosin, the most potent active principle. Marmelosin acts as laxative and diuretic in doses of 0 05 gm Larger doses depress the heart Extracts made from the fresh or dried unripe fruit are used effectively in treatment of chronic diarrhoeas and dysenteries

Alangium salviifolium (Linn f) Wang Syn -*A. lamarckii* Thwaites (Vern -S -Ankota, H -Akola, B -Akar Kanta, Bo -Ankola, M.-Alangi).

Grows in forests throughout India and Burma Root bark is used as an anthelmintic and purgative also as a remedy for leprosy and skin diseases Bark contains an alkaloid alangin (0 82%) which produces a fall in blood pressure and depression of the heart Respiration becomes irregular Parasympathetic mechanism is stimulated No clinical trials have been carried out

Allium sativum Linn (Garlic Vern -S -Lasuna, H & Bo -Lasan, B -Rasun, M.-Vallaipundu). B P C & I P C

Is grown all over India and is used as a spice in cooking. It is considered to be hot and stimulant and useful in fevers, coughs and other debilitating conditions Externally it acts as rubefacient in skin diseases. It contains a volatile oil (yield from 0 06 to 0 1%), allacin and a crystalline substance isolated from the alcohol-insoluble fraction of the residue Garlic has an antiseptic action and slightly tonic effect on frogs' heart and a paralysing effect on isolated rabbit intestine Garlic juice is used as an antiseptic for wounds It is considered useful in digestive

disorders and respiratory diseases such as pneumonia, pulmonary tuberculosis and bronchitis Contains a powerful antibiotic principle effective against tubercle bacillus

Aloe vera ex Linn. (Vern.-Musabbar, S & B -Ghrita Kumari, H.-Ghi kanvar, M -Kattalai) Syn -*A. barbadensis* Mill B P, B P C., I P. C & I P L

Native of North Africa but grows in East and West Indies, India and China In India it is found in the dry valleys upto Cape Comorin It is used as stomachic, purgative and emmenagogue, and in the treatment of piles, rectal fissures and as a poultice for application to inflamed parts It contains a mixture of glucosides called aloin It is valuable in the treatment of constipation

Alpinia galanga Willd (The greater Galangal Vern -H -Bare kulinjan, B -Sugandha-vacha, M -Pera-rattai) I P C

Is a native of Sumatra and Java but commonly found in East Bengal and South India Rhizome is used in bronchial catarrh and rheumatism, tubers and seeds are carminative and useful for impotence and nervous debility Root contains compheride, galangin and alpinin From the green rhizomes a pale yellow oil is obtained The drug is depressant to cardio-vascular system and stimulates respiration in smaller doses but larger doses depress it. Bronchioles are dialated It is used as an expectorant in respiratory troubles of children and in asthma, intestinal and biliary colics

Alstonia scholaris R Br (Dita-bark Vern -S -Sapta parna, H -Chatium, B -Chhatim, M -Edakula-pala) I P C

Is cultivated throughout India and found in sub-Himalayan tract upto 3,000 ft Also found in Bengal and in Southern India Bark is used as tonic and alterative It is considered useful in fevers and skin diseases It contains a bitter principle ditain, alkaloids ditamine, echitamine, and acid and fatty resinous substances The alkaloids are not protoplasmic poisons. They relax isolated strips of rat intestine In the intact cat, the alkaloids produce a sharp fall of blood pressure Larger doses produce irregularities of heart beat Drug is used in the treatment of malarial fever, chronic diarrhoea and advanced stages of dysentery Recently shown to have no specific curative action in malaria

Amomum subulatum Roxb The greater Cardamom (Vern -S -Brihat-upa-kunchika, H & B -Bara-elachi, M -Periya-yelakkay) I P C

Grows in Nepal and Darjeeling Hills Used for flavouring purposes Seeds contain an oil rich in cineole

Andrographis paniculata Nees (The Creat Vern -S -Bhunimba, H -Kiryat, B -Kalmegh, M -Nila vembu) B P C, I P C & I P L

Is found throughout the plains of India from Lucknow to Assam and is also cultivated in gardens in some parts of India Leaves and juice are used to relieve griping, irregular stools and loss of appetite in children. Roots and leaves are used as febrifuge, tonic, alterative and anthelmintic Leaves contain two bitter substances and traces of an essential oil No systematic pharmacological investigations have been carried out. It has an intensely bitter taste.

Antiaris toxicaria Letsh. (The Upas tree Vern -Chanduka, Bo - Chandla, M -Nettavil, Sing -Riti, Burm -Hmyaseik)

Grows in Java, Malaya and Burma In India it is found in Concan, Canara, Travancore and Coorg Juice from leaves and bark is used as an arrow poison in Java, Malaya and Burma Bitter seeds are used as a remedy for dysentery and as a febrifuge in doses of half a seed three times a day. Milky juice of the plant contains antiarol, large amounts of potassium nitrate, antiaresin, a crystalline protein and three glucosides α antiarin, β-antiarin, γ-antiarin Preliminary toxicity tests on guinea pigs revealed that the drug is highly poisonous and the M L, D is 6 mgm per kilo body weight Death occurs due to heart failure It also produces marked tonic contraction of the isolated and intact intestines No therapeutic trials have been carried out

Arachis hypogaea Linn (Vern -S -Buchanaka, H -Mungphali, B -Chiner badam, Bo -Bhui-chane, M -Nila kadalai) Ground Nut B P., B P C , I P C & I P L

Originally a native of Brazil but now cultivated in all tropical or sub-tropical countries India is the largest producer The seeds are used as food, and oil as nutritive, laxative and emollient Seeds yield 40 to 50 per cent of a clear fixed oil which is used as a substitute for olive oil in India, as a basis for liniments and ointments Also used in the manufacture of soap and cosmetics, leather dressing and as substitute for tallow and diesel oil

Areca catechu Linn (The areca or betelnut palm) (Vern -S.- Gubak, H & B -Supari, Bo -Sopari, M -Kumugu) B P C , I P C & I P L

Grows in Sunda Islands but extensively cultivated in Southern India, Assam and Eastern Archipelago It is widely used in India and China as anthelmintic in man and animals, and as a masticatory to prevent the decay of teeth The seed contains alkaloids arecaine 0 1%, arecoline 0 07 to 0.1%, arecaidine, guvacoline, guvacine and choline, tannin 15% and fat 14% Arecoline is a highly toxic substance and its action resembles muscarine The seeds are used as anthelmintic in doses of 6 drams and for astringent action in relaxed condition of bowels.

Argemone mexicana Linn (Mexican Poppy) (Vern -Bharbhand, Kandiari, S -Srigala-kantaka, H & B -Sialkanta, M -Birama-dandu)

Grows wild all over India Juice of plant is used to cure dropsy, jaundice and cutaneous affections The seeds and seed-oil is used as a remedy for dysentery and intestinal affections The plant contains alkaloids, berberine and protopine The seeds yield about 22% of argemone oil which is used as a purgative but has no special advantage over other purgatives It is used as an adulterant of mustard oil and is believed to produce epidemic dropsy.

Aristolochia indica Linn. (Vern.-S.-Rudrajata, H. & B.-Isharmul, M.-Ichchura-mula). I P.C. & I.P.L.

Grows all over tropical portions of India, Bengal, Konkan, Travancore and Coromandel Coast. Root is used in the treatment of bowel complaints in children and in fevers. It possesses emmenagogue and anti arthritic properties. Constituents of the root are an essential oil,

a bitter substance and an alkaloid aristolochin The alkaloid produces cardiac and respiratory paralysis in frogs and mice Skeletal muscles are stimulated in small doses More detailed pharmacological investigations and clinical trials are indicated •

Artemisia Sp (Vern —Kirmala)

Grows abundantly in the Himalayas from Kumaon to Kashmir at altitudes of 4,000 to 12,000 ft, also in Baluchistan, Chitral and Afghanistan. Flowering tops are used as anthelmintic in 2 to 4 dram doses The drug is also used as a remedy for dropsy and as cardiac and respiratory stimulant. It contains a volatile oil, santonin and an allied body—artemisin.

Artemisia absinthium Linn Wormwood (Vern -H. & Dec - Vilayati afsantin).

Grows in Kashmir at altitudes of 5,000 to 7,000 ft The oil has a tonic and stimulating effect on the digestive system Contains 0 3 per cent. of an essential oil, a bitter glucoside absinthin and a crystalline compound

Artemisia dracunculus Linn

Found in western Tibet at altitudes of 14,000 to 16,000 ft and in Lahul Leaves are used for flavouring vinegar and as a spice. They contain about 0 3 per cent of an essential oil

Artemisia maritima Linn (Vern -S -Gadadhar, H -Kirmala, Bo. Kiramani owa) I P C & I P L

Found in Western Himalayas from Kashmir to Kumaon at altitudes from 7 000 to 9,000 ft in Kashmir, Kurrum, Kagan, Bushher, Waziristan and Chamba.

Artemisia pallens Wall ex-DC (Vern -Davana)

Grows in certain parts of South India in Mysore State and is also cultivated near Poona. Leaves are used as floral decoratives and the oil from the herb is a popular article in perfumery.

Artemisia sacrorum Ledele (Vern P.-Tatwen)

Grows in Western Tibet, Kanawar and in Tibetan regions of Kumaon at altitudes of 10,000 to 12,000 ft Contains 1 per cent. of an essential oil

Artemisia vulgaris Linn (Vern -Tithwan, S -Nagadamani, H -Nagadouna, B -Nagdona).

Grows throughout the mountainous regions of India ascending to an altitude of 12,000 ft., in western Himalayas upto 5,000 to 8,000 ft, in Sikkim and Khasia Hills, also in Mount Abu and Western Ghats, Used as antiseptic expectorant and anthelmintic Contains 0.2 per cent of a volatile oil which is a good larvicide.

Asteracantha longifolia Nees Syn.-*Hygrophila spinosa* T Anders. (Vern -S.-Kakilakshya, H -Talmakhana, B. Kuliakhara, Bo.-Talim khana, M -Vallarai) I P C

Grows commonly in moist places throughout India from Himalayas to Ceylon Roots are used as cooling, diuretic, stimulating and to remove dropsical fluids and kidney stones They contain phytosterol, traces of an essential oil, a yellowish green wax, gum and maltose Seeds contain an oil 23 per cent and an alkaloid. No pharmacological and clinical studies have been carried out

Atropa acuminata Royle (Vern -Sag-angur) B P , B P C & I P C.

Grows in abundance in the Himalayan ranges extending from Simla to Kashmir, at altitudes of 6,000 to 12,000 ft In Jammu & Kashmir State, it is found in the forest mountains round Kashmir valley. It is also found in Himachal Pradesh, Kulu, Parbati valleys and Narkanda forests of Simla Hills Belladonna and its alkaloid atropine are largely used as a sedative, antispasmodic and mydriatic in diseases of the eye, and as antidote in opium and muscarine poisoning Alkaloids (as hyoscyamine) are present from 0 15 to 0 7 per cent in the leave sand 0 3 to 0 66 per cent in the root Traces of an inactive volatile alkaloid is also present The plant is now cultivated and large amount of belladonna preparations in India come from this source

Azadirachta indica A Juss (Vern -Nim) The Neem. I. P C. & I P L

Grows throughout the greater part of India and Burma Bark and leaves are used as a bitter tonic and astringent It is considered useful in skin diseases Fruit is used as purgative, emollient and for expelling intestinal worms Considered beneficial in urinary diseases and in the treatment of piles Bark contains an alkaloid margosine and seeds yield a fixed bitter oil Margosates are toxic to protozoa and bacteria Clinical trials revealed that the drug has a beneficial effect in skin diseases

Bacopa monnieri (Linn) Pennell, Syn *Herpestis monniera* (Linn) H B & K (Vern -S -Brahmi, H -Braehmbhi, B -Brihmisak, M -Nirbrami) I P. C

Grows throughout India on the borders of streams and tanks Roots, leaf and stalks are used as nerve tonic and as a remedy for insanity and epilepsy It contains an alkaloid, herpestine, which is highly toxic It produces a fall of blood pressure and stimulation of respiration. The smooth muscle of intestines and uterus is stimulated. In therapeutic doses it resembles strychnine Powdered dried leaves gave satisfactory results in cases of asthenia and nervous break down Further clinical trials are needed

Bambusa bambos Druce, Syn.—*B. arundinacea* Willd. (Vern.-Kantabans, S.-Vansa, B. & H -Bans, Bo.-Mandgay).

Grows wild throughout the greater part of India particularly in the hilly forests of Western and Southern India upto an altitude of 3,000 ft. Leaves are considered useful in diseases of blood, leucoderma and

inflammatory conditions Tabashir found as concretions in it is used against blood diseases, tuberculosis, asthma and leprosy Seeds contain water 11 0 percent , starch 73 7 percent , albuminoids 11 8 per cent , oil 0 6 per cent, fibre 1 7 per cent and ash 1 2 per cent Young shoots contain a cyanogenetic glucoside No systemmatic work has been done to determine its proper therapeutic efficacy

Berberis aristata DC (The barberry) (Vern -Chitra, S -Daru haridra H -Dar-hald) I P L. & I P C

Grows in the temperate Himalayas at an altitude of 6,000 to 8,000 ft A tincture made from root bark was used as a bitter tonic, stomachic, cholagogue, antiperiodic and alterative Berberine is the chief alkaloid, also umbellatine is present It is used as diaphoretic and antipyretic in malarial fever but has little specification

Berberis asiatica Roxb. (Vern.-Sumlu, H -Kilmora, Nepal -Chitro). I P.L.

Grows in dry valleys of the Himalayas at an altitude of 3,000 to 7,500 ft in Bhutan, Garhwal and Behar Its uses are similar to those of *B aristata* and its active principle is berberine

Berberis coriacea—Brandis (Vern -Simla-Kashmal) I P L.

Grows in N W Himalayas at an altitude of 8,000 ft

Berberis floribunda Hort

Grows in Nepal The roots contain eight alkaloids namely Oxycanthine, bebamine, berberine, epierberine, palmatine, dihydrocarydeline, jatrorrhizine and columbamine No detailed pharmacological studies have been carried out but the action of these alkaloids would appear to resemble berberine.

Berberis himalaica

Found in Bhutan Bark contains berberine (0 03%), jatrorrhiszine (0 01%) and an alkaloid limanthine It has not been used in medicine although it belongs to berberis group of plants.

Berberis insignis Hook

Grows in humid forests of the Eastern Himalayas from Nepal and Sikkim to Bhutan at altitudes of 8,000-10,000 ft Stem bark contains 1 52 per cent and root bark 2 5 per cent of total alkaloids consisting chiefly of umbellatine

Berberis lycium Royle (Vern H -Kashmal, Bo -Darhald)

Grows in the Western Himalayas at altitudes of 3000-9000 ft from Garhwal to Hazara It is used as febrifuge carminative and aperient and is considered beneficial in piles, enlargement of liver and spleen and as external application to eyelids in conjunctivitis. It contains alkaloid umbellatine.

Berberis umbellata Wall.

Occurs on Himalayan ranges at altitudes from 9,000 to 12,000 ft. from Kashmir eastward to Bhutan. Bark contains Umbellatine which like berberine has a specific inhibitory action on *Lieshmania tropica*. The cardiovascular system is depressed and para-sympathetic nervous system is stimulated. Respiration is depressed.

Berberis vulgaris Linn (The true barberry) Vern. Zirishk, P-Kashmal) I P L

Grows in the Himalayas from Nepal westwards at an altitude of over 8,000 ft It is used as diuretic, astringent and refrigerant In small doses it acts as a tonic and in large doses as a purgative It contains berberine which has an inhibitary action on *leishmania*.

Blepharis edulis Pers (Vern —H -Utanjan, Bo -Utangan).

Grows in the Punjab and Baluchistan. Leaves used as astringent in bowel complaints It has aphrodisiac and alterative properties It is useful in fevers, urinary discharges and leucoderma. Seeds contain a bitter glucoside belapharine (1 2 per cent) and dl-allantoin (2 1 per cent.) No detailed pharmacological studies have been carried out.

Boerhaavia repens Linn (Vern Thikri, S - Shothaghni, H -Sant, B -Punarnaba, Bo -Ghetuli, M -Mukuk-rattai) B P , I P C. & I P L.

Grows all over India It is used as laxative and diaphoretic in oedema, anaemia, heart disease, cough and intestinal colic. It contains an alkaloid named punarnavine and an oily amorphous matter Sulphates, chlorides, nitrates and chlorates occur in ash The alkaloid is not toxic. It has a diuretic effect and raises blood pressure The movements of intestines are depressed The liquid extract in doses from one to four drams produces definite diuresis in patients with oedema and dropsy

Bragantia wallichii R Br (Vern —Chakrani).

Grows in southern half of Bombay State near the Coast, Madras and Ceylon. Used to cure chronic sores and ulcers Considered useful in cholera and diarrhoea. Roots contain a fatty oil and a yellow substance identical with isoaristolochic acid No pharmacological studies or clinical trials have been carried out.

Butea monosperma Lam -Kutze (Vern. Palas) I P C

Grows throughout India and Burma extending in the N W. Himalayas as far as Jhelum Gum (Kino) is used as astringent, diuretic and aphrodisiac. Seeds are used as an anthelmintic and contain 18 per cent. of a fixed oil, small quantities of resin and large amounts of water-soluble albuminoids The oil does not possess any marked anthelmintic action No systematic investigation has been carried out.

Butea superba Roxb. (Vern.-Palarvela, S Lata palas, H. & B.-Paas lata, M.-Kodi-murukkan).

Grows in the forests of Oudh and Bundhelkhand, Chotanagpur, Central and Southern India. It is used as a remedy against eruptions in children, Decoction of stem and leaves is emollient and is used as a

local application for piles. Root contains an esterogenic substance and a poisonous substance Flowers contain butrin, butein and butin An aqueous extract equivalent to 0.002 per cent of the dried powder causes estrus in spayed female mice Further pharmacological studies are indicated

Caesalpinia crista Linn Syn - *C. bonducella* Fleming. Fever nut (Vern -S -Kuberakshi, H -Kat-karanj, B -Nata-karanja, Bo -Sagara-goth, M -Gajega) I P.C.

Grows near the sea-coast, all over Bengal, Bombay and S India Seeds, leaves and roots are used as anthelmintic, emmenagogue and febrifuge Seeds contain starchy matter, a bitter principle called bonducin and an oil The plant is not of much therapeutic value

Calotropis gigantea Linn.- (Gigantic swallow root) (Vern Ak-Madar, S -Arka, H -Ak , B & Bo -Akanda, M -Erukku) I P C.

• Grows in waste lands all over India upto altitudes of 3,000 ft Milky juice is used for tanning and dyeing purposes An intoxicating liquor is prepared from the juice Latex contains water soluble matter 86 to 95 5 per cent Stem bark contains calotropeolis, B-amyrin and giganteol No marked therapeutic value.

Calycopteris floribunda Lam (Vern H -Kokoranj, Bo.-Ukshi, M -Marsada boli)

Grows in Central and Southern India in plains and upto an altitude of 2,500 ft Leaves used as laxative, anthelmintic and the juice given in puerperal fevers Also used in the treatment of dysentery and malarial fevers The juice contains, chlorides, sulphates, nitrates, lime, ferric oxide, tannin, albuminoids and gummy matter Leaves contain a yellow crystalline flavone, calycopterin. The drug is toxic to fish and earthworms , more toxic to earthworms than santonine or chenopodium oil No detailed pharmacological and clinical investigations have been carried out

Camellia sinensis Linn (O Kunfize) Vern -Cha Tea plant B P & B.P.C.

In India, tea and coffee grow luxuriantly. Coffee is grown principally in Madras, Coorg, Mysore, Travancore and Cochin. Tea is also found in Ceylon and is grown in Assam, Bengal, Madras and Travancore Tea is used as a beverage in India and other parts of the world Tea leaves contain from 2.5 to 3% of Caffeine Coffee contains 1 5 per cent of caffeine Caffeine is used in medicine for stimulation of central nervous system and circulation and as a diuretic.

Cannabis sativa Linn. (*Cannabis indica*) (Vern S.-Ganjika, H & Bo -Ganja, M -Bhangi, Bhang) B P C , I.P C. & I.P L

Grows wild throughout the Himalayas from Kashmir to East of Assam and also in Southern India. Plant and its products are used for narcotic purposes, by smoking or taking internally It contains a terpene 1 5 per cent , a sesquiterpine 1 75 per cent., small amount of paraffin carbon and a resin named as Cannabinol (33 per cent.). Hemp drugs are consumed all over the world for euphoric purposes Their use alleviates the feeling of fatigue, encourages sleep and soothes restlessness.

Sensation of time and space is lost. Larger doses produce mental derangement and even insanity.

Carica papaya Linn. (The Papaya) (Vern Papita, H.-Papaya, B.-Papey, Bo -Papai, M -Pappayi). B.P , B.P.C , I P.C & I.P L.

Grows all over India and is used as anthelmintic, emmenagogue and digestive. The fruit pulp contains sucrose, invert sugar, resinous substance, papain, malic acid, salts of tartaric and citric acids and vitamins. Seeds contain, proteins, carbohydrates, fatty oil, volatile oil, an alkaloid carpaine, a glycoside carposide and an enzyme myrosin. Carpaine is a heart poison, it lowers blood pressure and depresses heart No proper clinical trials have been carried out

Carum carvi Linn The Caraway seed (Vern Zira, H.-Shiajira, B -Jira, M Shimai-shombu) B.P., B P C & I P C

Widely distributed in the temperate regions of both the hemispheres Grows in North and Central Europe, extending to the Caucasus, Persia, Tibet and Siberia In India it is cultivated on the hills of Baluchistan, Kashmir, Kumaon, Gharwal, Chamba at altitudes of 9,000 to 12,000 ft. Used as a cookery condiment Oil is used for flavouring purposes and as a carminative Seeds contain an essential oil with a marked carminative action

Cassia absus Linn (Vern H —Chaksu, N —Karun Kanam).

Grows in lower parts of the Western Himalayas and Ceylon Leaves are applied locally to tumours and internally in cough, asthma and bronchitis Seeds are used as bitter, astringent and diuretic and contain two water soluble bases, chaksine and Isochaksine, as carbonates (1 5 per cent) Premliminary studies show, that chaksine sulphate is depressant to heart, respiration and nerve centres More detailed studies are indicated Considered useful in eye diseases. No clinical trials have been carried out

Cassia angustifolia Vahl (Vern H -Hindisana, B.-Sonamukhi, M -Nila vakai) B.P , B P C & I P.C.

Cultivated in S India in Madras State (Madura) Leaves and pods are used as purgative. Leaves and pods contain cathartic acid, emodin and chrysophanic acid Senna is useful in habitual constipation. It increases the peristaltic movements of the colon. The tendency to gripe is overcome by mixing it with aromatics

Cedrela toona Roxb (Vern Mahalimbu, S. & B.-Nandibriksha, H -Tun, Bo.-Tuni, M -Tunumaram, P -Khushing).

Grows in Sub-Himalayan tracts from river Indus eastwards, Chittagong, Assam, Burma, Chotanagpur, Western Ghats of Bombay to the Nilgiris and other hills of the Deccan Peninsula The plant is used as astringent in the treatment of ulcers, gleet and scabies Flowers are used in menstrual disorders and contain a red colouring matter, nyctanthin, flavone and a glucoside. Bark contains, tannic acid, a bitter resin, citric acid and starch. No pharmacological or clinical investigations have been carried out.

Celastrus paniculatus Willd (Vern. S -Kanguni, H -Malkanguni, M -Valuluwai)

Grows in Sub-Himalayan tracts extending from Jhelum to Assam ascending to an altitude of 6,000 ft and in hilly parts of Bombay State, South Gujrat, Central India and Madras Seeds and oil are used in the treatment of rheumatism, gout, paralysis and epilepsy Oil is considered as nerve stimulant and brain tonic Leaves contain an alkaloid, a glucoside and colouring matter Seeds contain 52 2 per cent of a thick brownish oil No pharmacological studies have been carried out.

Centella asiatica (Linn) Urban, Syn -*Hydrocotyle asiatica* Linn (Vern -Brahmi, S -Vanduka paini, H -Brahmo manduki, B -Tholkuri Bo.-Karivana, M -Vallarai) I P C

Grows throughout India from Himalayas to Ceylon at an altitude of 2,000 ft Plant is used as tonic and is considered beneficial in diseases of the skin, nervous system and blood Also used in the treatment of leprosy and syphilitic affections. It contains an alkaloid, hydrocotyline and fresh leaves contain a glucoside asiaticoside Hydrocotyle is shown to be a circulatory stimulant Further work is indicated.

Centratbrum anthelminticum Kuntze, Syn - *Vernonia anthelmintica* Willd (Vern -S , H & B -Somaraj, Bo -Kalijiri, M -Kattu-Shiragam). I P C & I. P. L.

Is found in waste lands near villages throughout India The seeds are used as a remedy for leucoderma and other skin diseases, and as anthelmintic They contain a bitter principle 1 per cent, a fixed oil 18 per cent and a small amount of an essential oil No systematic pharmacological investigations have been carried out Clinical trials revealed that it is effective in thread-worm infections Further work is needed

Cephaelis ipecacuanha A Rich Syn -*Psychotria ipecacuanha* stokes B P , B P C & I P C.

Grows wild in Brazil In India it has been cultivated in South India and Bengal—in Darjeeling hills Contains emetine and other alkaloids used in the treatment of amoebic dysentery

Cerbera odollam Gaertn Syn -*C. manghas* Linn. (Vern B -Dhakur, M -Katarali).

Grows all over India particularly in salt swamps in the Malabar Coast, Ceylon and Burma Plant is intensely poisonous The leaves and sap have emetic and purgative properties Seeds contain three glycosides named as cerberin, odollin and cerbeside Cerbrin is non-irritant to the skin and mucous membranes and produces vomiting, diarrhoea and even syncope when given subcutaneously Stimulates cardovascular system and smooth muscles Further clinical trials and experimental work is indicated.

Chenopodium ambrosioides Linn B P , B.P C , I.P.C. & I.P.L.

Grows in Central America, East Indies. In India found in Bengal, Sylhet, the Deccan (Coimbatore) Infusions from leaves and seeds used as a remedy against intestinal worms Seeds contain a volatile oil which

contains ascaridole from 45 to 70% Small portions of glycol-anhydride, mixture of hydrocarbons and traces of fatty acids also occur Clinical trials have shown its efficacy against hookworms and round worms

Chenopodium botrys Linn

Grows in the Himalayas from Kashmir to Sikkim Used as a substitute for *C ambrosioides* Contains a volatile oil 0 03 to 0.04 per cent

Cichorium intybus Linn (Vern -Kasni)

Grows in North Western India and is cultivated in Nadiad, Broach and Amalsad in Bombay State Used as fodder Cultivated sweet variety is considered beneficial in acne, opthalmia and throat inflammations Roots used as diuretic and to enrich and purify blood Wild variety used as emmenagogue and to cure asthma Plant contains a glucoside cichorin Seeds contain, a semi-drying oil, water, gum, glucose, bitter substances, inulin and fibre No systematic studies of its therapeutic action carried out

Cinchona Cinchona bark B P., B P C , I P.C & I P L.

Cinchona grows on the Eastern slopes of Central Western chain of the Andes mountains in South America, at altitudes of 2,500 ft to 9,000 ft. It is cultivated in India in the Nilgiris Hills, Mungpoo in Ranchi Valley and the Karen Hills in Burma The bark contains quinine, cinchonidine, quinidine and cinchonine It is used in the treatment of malaria

Cinnamomum Blume.

Grows in Asia and Australia About 20 species occur in India Used as an aromatic and spice

Cinnamomum camphora Nees B.P , & B.P.C.

Cultivated in India at Dehradun, Saharanpur, Calcutta, Nilgiris and Mysore

Cinnamomum zeylanicum Breyn (Vern —Dalchini, S -Gudatreaka) B P , B P C & I P C

Grows wild on Western Ghats from Konkan southwards and in forests of Tenasserim in Burma Found abundantly in Ceylon Used as carminative, astringent, stomachic, flavouring agent and as a spice. Bark contains an essential oil 0 5 to 1% Leaves yield a dark coloured oil 1%

Cissampelos pareira Linn (Vern —Akanadi, S -Patha, H & B -Nirbisi) I P C

Grows throughout tropical and sub-tropical parts of Asia, East Africa and America Root is used to relieve pain and is considered useful in febrile conditions, dysentery, heart troubles and urinary disorders. Contains an amorphous alkaloid named pelosine, saponin and ammonium salts, also hayatin and hayatinin Hayatin methiodide, methochloride have curariform activity equal to tubocurarine chloride They produce fall of blood pressure which is prevented by antihistaminic drugs Further studies are in progress. A plant likely to be of great therapeutic value.

Citrullus colocynthis Schrad. (Vern.—Indrayan, S.-Indra-varuni, H. & Bo-Indrayan, B.-Makhal, M.-Peyt-tumatti). B.P., B.P.C. & I.P.C

Grows in arid tracts of N West, Central and South India and is met with in the Punjab, Sind and on the Coromandel coast. Fruit is used as cathartic to relieve biliousness and constipation, used in treatment of fever and intestinal parasites Plant contains a bitter principle colocynthin and traces of an alkaloid Used in medicine as a drastic purgative

Citrus aurantii-folia (Christm) Swingle Syn -*C medica*, var *acida*. The Lime Tree.

Citrus limon (Linn) Burm f *Syn,-Citrus medica*, var. *limonis*. The Lemon Tree B P., B P.C., I P C & I P L

Lime and lemon are found growing wild in the warm valleys of the North West Himalayas Also largely cultivated in the plains and up to altitudes of 4,000 ft Used as flavouring agent in medicine and also as a carminative and stomachic Peel contains an essential oil and juice citric acid upto 5 9 per cent

Cleome icosandra Linn. (Vern —Aurhur).

Grows throughout India but commonly found in Bengal and S. India Seeds are used as anthelmintic, rubificient and vesicant They contain a fixed oil (36 59 per cent) and a new flavone called 'Viscosin' No work on its pharmacological action and therapeutic properties has been carried out

Clerodendron infortunatum Linn (Vern.—H & B.-Bhant, Bhat)

Grows in waste lands throughout India and in damp forests of Ceylon, upto an altitude of 5,000 ft. Used as a vermifuge, anthelmintic and a substitute for Chireta Leaves contain ash 8.04 per cent, protein 21 1 per cent., crude fibre 18 84 per cent, total sugars 17 05 per cent and a bitter substance clerodin The last named has no haemolytic and bactericidal action It is toxic to earthworms, small fish and mosquito larvae. No clinical trials carried out

Coccinia cordifolia Cogn Syn - *Cephalandra indica* Naud, (Vern,- S -Bimba, H -Kanduri-ki-Bel, B -Telakucha Bo -Bhimb)

Grows wild in Bengal and other parts of India It is said to have antidiabetic properties It contains an enzyme, a hormone and traces of an alkaloid Did not show any action on blood sugar in animals nor by clinical trials in diabetic patients.

Colchicum luteum Baker (Vern —Surinjan) I P C. & I.P L.

Grows extensively in the Western temperate Himalayas, extending from Murree hills to Kashmir and Chamba. Used as an alterative and aperient in gout, rheumatism and diseases of liver and spleen. Bitter variety contains alkaloid colchicine, starch and oily resinous matter Galenical preparations of the crude drug and the alkaloid colchicine are used in the treatment of gout. Recently colchicine has been widely used in plant breeding to induce polyploidy.

Commiphora mukul Engl. (Gum gugul) (Vern -S-Guggulu, H, B. & Bo.-Guggul, M.-Gukhulu).

Grows in Rajputana, Khandesh, Sind, East Bengal and Assam The gum resin from bark is used as demulcent, aperient, carminative and alterative and is useful in leprosy, rheumatism, syphilitic disorders, nervous and skin diseases and urinary disorders Gum resin contains 32 per cent. gum, 19.5 per cent. mineral matter and 1.45 per cent of an essential oil. The pharmacological action of this oleoresin resembles the action of copaiba and cubebs Taken internally it acts as bitter, stomachic and carminative It also acts as diaphoretic, expectorant and diuretic, It is said to be uterine tonic and regulates menstrual functions No proper chemical trials have been carried out

Coptis teeta Wall. (Vern H -Mamira, B -Tita, Bo-Mahmira) I P.L.

Grows in upper Assam. It is used as an eye salve in indigenous medicine. Active principles berberine 8 5 per cent, coptine (0.08 per cent), palmatine (traces), coptisine 0 02 per cent and jatrorrhine (0 01 per cent) It is used as a bitter tonic in the same way as Calumba.

Coscinium fenestratum Colebr. (Vern —Haligach, S.-Daru haridraka, B -Haldi-gach, M -Mara-manjal) I.P C.

Grows in the forests of Western India and is used as a bitter tonic. It contains berberine

Crocus sativus Linn (Vern.—Kesar, Safran, S -Kumkuma, H & Bo.-Jafran, M -Kungumapu) B P C, I P C & I P L

Is commonly found in Kashmir and Quetta and also cultivated in Spain It is considered to be stomachic, stimulant, antispasmodic and aphrodasiac. It is used as flavouring and colouring agent in cookery. It contains three crystalline colouring matters, α-crocetin, β-crocetin, γ-crocetin, a fatty oil, a volatile oil and a bitter substance The essential oil has the characteristic features of other essential oils No proper clinical trials have been carried out.

Curcuma longa Linn Syn -*C domestica* Valeton (Vern —S -Haridra, H.-Haldi, B -Halood, Bo -Halada, M -Munjal). B. P C. & I P C.

Grows throughout Southern parts of Asia, in India, China and East Indies. Also cultivated in almost all the States of India, particularly in Madras, Bengal and Bombay Used as a spice Hakims use it as a stomachic, tonic and blood purifier The juice of rhizome has anti-parasitic action in affections of skin Rhizome contains an essential oil 5.8 per cent., protein, mineral matters, carbohydrates, and vitamin A. The oil has slight anti-bacterical properties Taken internally it has antacid action and relaxes the intestines. Used as a stomachic and carminative.

Curcuma zedoaria Rosc. (Vern.—S.-Sati, H. & Bo.-Kachura, B -Shori, M.-Pulan-ki-zhanga).

Grows in Eastern Himalayas and Kanara, Ceylon and China. It is also cultivated in many Indian States. Rhizomes are used as aromatic, stomachic, stimulant and carminative. Externally applied on bruises

and sprains. Contains an essential oil 1.5 per cent., starch 82.6 percent., ash 1.01 per cent and moisture 13·1 per cent The essential oil is carminative and produces relaxation of the intestines

Cuscuta reflexa Roxb. (Vern —S -Amaravela, H -Akasbel, B.-Algusi, Bo -Nirmuli, M.-Sitama-purgonalu).

Grows throughout the plains of India upto an altitude of 5,000 ft Used as carminative, purgative, diuretic and purifier of blood. Seeds contain a bitter substance, a glucosidal resin and quercetin Plant also contains, cuscutin, cuscutalin, brown wax and reducing sugars. No pharmacological studies have been carried out.

Daemia extensa R Br (Vern —S.-Phala kantak, H.-Utran, B.-Chagul-banti, Bo & M -Utarni) I.P C

Grows throughout the hotter parts of India upto an altitude of 3,000 ft Used as cooling, anthelmintic, laxative and antiperiodic. Considered useful in eye troubles, uterine disorders and urinary troubles The plant contains 2 4 per cent of inorganic salts, a bitter resin, and three bitter substances Bitter principle C is the most active pharmacologically Has a stimulant action on uterus, intestines, due to direct action on the involuntary muscle Further pharmacological studies are in progress

Datura stramonium Linn (Vern —B -Sada dhutura, P -Tattu dattura, M -Umatai) B P ,B P C & I P C

Grows throughout the temperate Himalayas from Kashmir to Sikkim Used as intoxicant, emetic, digestive and as antispasmodic in asthma and whooping cough. Seeds and leaves contain hyoscyamine, atropine and hyoscine Datura possess properties similar to belladonna

Dichora febrifuga Lour. (Vern.—H -Basak, Nep -Aseru).

Grows in the temperate Himalayas from Bhutan to Khasia hills, at altitude of 4,000 to 8,000 ft , also in Upper Burma, Malayan Peninsula and China Roots are used to cure malaria in China and as a febrifuge in India. Roots and leaves contain two alkaloids, febrifugine and Isofebrifugine Clinical trials have revealed that the drug has antipyretic action like quinine (1 5 times) but no anti-parasitic action. Further work is indicated

Didymocarpus pedicellata R Br

Grows in subtropical regions from Chamba to Kumaon at altitude between 2,500 and 5,000 ft Leaves are used as a remedy for stones in kidney and bladder The plant contains pedicin 1 per cent., iso-pedicin 0.4 per cent , pedicinin 0.3 per cent. and pedicellin 1 per cent which are crystalline No detailed pharmacological and clinical trials have been carried out.

Digitalis lanata Ehrh. Grecian Foxglove B P , B.P.C. & I.P.C

Grows in Kashmir at altitudes about 7,000 ft Fresh leaves contain 3 natural glucosides lanatosides A, B & C which on hydrolysis give digitoxin, gitoxin and digoxin Digoxin produces the same cardiac effects as digitalis. It is 300 times more potent than prepared digitalis

and is of particular value for rapid digitalization. Digitalis increases the force of systolic contractions and efficiency of the decompensated heart Slows the heart rate and reduces cardiac œdema with diuresis

Digitalis purpurea Linn Foxglove. B P., B P.C. & I P. C.

Cultivated or found as an escape in hilly regions at altitudes of 5,000 – 6,000 ft Originally a native of Western Europe but now extensively grown in many parts of the world In India, it is found in Kashmir Himachal Pradesh, Darjeeling area and other parts. It is used as a myocardial stimulant in congestive heart failure Used as a heart tonic and diuretic Contains several glucosides but the leaves contain digitoxin, gitoxin and gilatin

Dregea volubilis Benth. ex Hook (Vern —S -Madhu malati, H.-Nakchikni, B -Titakunga, Bo -Dodhi, M -Kodicpalay)

Grows wild in Assam, Bengal, Deccan, Peninsula from Konkan southward to Ceylon The plant is used to cure piles, leucoderma, asthma and urinary discharges It contains a substance of glucosidic nature with low toxicity and traces of an alkaloid It stimulates all organs having cholinergic nerve supply and causes a prolonged fall of blood pressure Further work is indicated

Eletttaria cardamomum Maton (Vern —S -Ela, H. & B -Chotielachi, Bo -Elachi, M -Ellakai) B P , B P C , I P C & I P L.

Grows in Western and Southern India in the forests of Kanara, Mysore, Coorg, Wynaad, Travancore, Cochin Also found wild in Burma, Ceylon, China and Malaya Archipelago Used as a spice and masticatory and in medicine as carminative and flavouring agent. Seeds contain an oil to the extent of 2 to 8 per cent.

Entada phaseoloides (Linn) Merr Syn.-*E. pursaetha* DC., *E. scandens* Benth

Grows in Central and Eastern Himalayas at altitudes of 4,000 ft and is also found in damp forests of Eastern Bengal, Bihar, Orissa, Eastern and Western Ghats Seeds are used as soap to wash hair Locally it is applied to swellings , it is a fish poison Seeds contain two saponins, entada-saponin A & B and 8 per cent of a fixed oil. Both saponins are toxic to rabbits and guinea pigs They produce hæmolysis of red blood cells and a depressant action on circulatory and respiratory systems Movements of smooth muscles are inhibited No clinical trials have been carried out

Ephedra gerardiana Wall Syn -*E vulgaris.* and allied sp. (Vern Amsania) B P C., I P C & I P L

All species grow in Northern India, Bashahr Division, Chakrata, Kangra, Kulu, Baluchistan, Kashmir, Hazara, Kagan and Waziristan. Contains ephedrine and pseudo-ephedrine. Ephedrine is a useful remedy for asthma Tincture of Ephedra is an excellent cardiac stimulant in toxic conditions

Erythroxylum coca Lam. B P. & B P.C.

Originally a native of South America but is grown in the West Indies, India, Ceylon and Java. Leaves used for euphoric purposes and

contain cocaine to the extent of 0 15 to 0 8 per cent. and other alkaloidal substances. Cocaine is used for local anaesthetic purposes and also as a euphoric

Eucalyptus L. W Ent (Vern.—Karpura Maram) Blue gum tree. B.P., B P C., I.P C. & I P.L

Grows naturally in Australia but cultivated in other parts of the world The oil from leaves is used in soap industry and as an antiseptic and disinfectant. Leaves and terminal branches yield an essential oil

Eugenia aromatica Kuntze Syn -*Caryophyllus aromaticus* (Vern. Long) B P & I P C

Native of Malacca Islands and is largely cultivated in Zanzibar, Pemba, the Amboyna Islands, Penang, Madagascar, Seychelles, Reunion, Mauritius and Ceylon and Southern India Dried buds contain an essential oil and are used as aromatic stimulant and carminative

Euonymus tingens Wall (Vern —Barphali, H -Kungku) (Dogwood) I P.C

Grows in tropical regions of Asia, Malaya, Europe and America. Used to stimulate torpid liver producing flatulence and indigestion.

Euphorbia hirta Linn Syn -*E piluhfera* Linn (Vern —H -Dudhi, B - Bara keru, Bo -Nayeti, M .-Amumpatchaiarissi). B P.C & I.P C.

Grows all over the hotter parts of India. It is used as a remedy for respiratory troubles, dysentery, colic and worms in childern It contains gallic acid, quercetin, traces of an alkaloid and an essential oil. The extract possesses depressant action on heart and respiration and produces relaxation of bronchioles It is used to relieve asthma and other spasmodic conditions of the respiratory tract

Ferula foetida Regel. (Vern —S -Hingu, H & B.-Hing, Bo -Kayam) Asafoetida B P C , I P C. & I P L

Found in Turkestan Gum resin used as a carminative, antispasmodic and as flavouring agent in spices Contains a volatile oil, resin, gum and impurities Used in medicine as carminative and antispasmodic in nervous disorders of childern and women

Foeniculum vulgare Mill (Vern —S -Madhurika, H —Bari-saunf, B -Pan-mauri, Bo -Bari sopha, M -Shombu). B P., B.P.C , I.P.C. & I P.L

Cultivated throughout India and also in cold places upto an altitude of 6,000 ft. Used as aromatic, stimulant and carminative. Fruit contains a volatile oil with pleasant aromatic odour, chief constituent of which is anethol but small quantities of substances like fenchone are also present.

Gaultheria fragrantissima Wall. (Vern.—Jar Gandapuro). Indian winter green. I.P.C & I P.L.

Grows freely in the Nilgiris, Travancore and Assam. Oil of winter green used as an external application for rheumatic affections, sciatica,

neuralgia and as a flavouring agent in tooth pastes, etc. Leaves contain an oil which mainly consists of methyl-salicylate.

Glycyrrhiza glabra Linn. (Vern —S -Yashti-madhu, H -Jethimadh, B. & Bo -Jashti madhu, M -Atimaduram) B P., B P.C. & I.P C.

Found in sub-Himalayan tracts from the Chenab westwards, Burma and the Andaman islands Used as a tonic, demulcent in catarrh of respiratory treat and genito-urinary passages and as laxative Roots contain a tribasic acid glycyrrhizic acid and potassium and calcium salts, glucose, sucrose and fat o 8 per cent. Used in medicine to cover the acrid taste of many nauseous drugs.

Gymnema sylvestre R Br (Vern —Gur mar, S -Meshasringi, H & B —Merasingi, Bo -Kavali, M -Shiru kurunja)

Grows in Central and Southern India and in Tropical Africa It is used as stomachic, diuretic, antiperiodic, antidiabetic and in urinary disorders It contains resins, a glycoside named as gymnemic acid, a bitter principle and some tartaric acid and calcium oxalate Experiments on animals showed no reduction of blood sugar The leaves stimulate heart and circulatory system and increase urine secretion Clinical trials showed no effect on blood or urine sugar of diabetic patients

Helicteres isora Linn (Vern —Kapasi) The East Indian screw tree

Is found throughout Central and Western India It is chiefly used in intestinal disorders such as colic, flatulence and diarrhoea It contains a demulcent substance and tannins The pods are used even today in some parts of India in the treatment of chronic diarrhoeas but clinical trials showed no marked action

Hemidesmus indicus R Br (Vern —S -Ananta, H -Magrabu, B. Anantamul, M.-Nannari) Indian Sarsaparilla I.P C.

Grows in Northern India, common in Bengal and in the Deccan, extending to Travancore and Ceylon and Bombay State. Used in the treatment of nutritional disorders, syphilis, chronic rheumatism skin affections and as a blood purifier Roots contain a steroptene, an essential oil, sterols, resin, tannin and small amount of glycosides Clinical trials show that its medicinal value is in no way inferior to imported Sarsaparilla.

Holarrhena antidysenterica Wall (Vern —Dhudi, S -Kutaja, H.-Karchi, B -Kurchi, Bo.-Pandhrakura, M.-Kashappuvetpalarishi) B P., B.P C , I P.C. & I P L

Grows throughout India upto an altitude of 3,500 ft and even as far south as Travancore Bark and seeds are used as a powerful antidysenteric, astringent, febrifuge, anthelmintic, carminative and aphrodasiac Bark and seeds contain kurchine, conessine, kurchicine and holarrhine Conessine is toxic to protozoa and is locally irritant The circulatory system is depressed and intestinal movements are stimulated , it has narcotic action on frogs The total alkaloids have similar action The extract from bark (containing one grain of total alkaloids in 4 c.c) given in doses of 2 drams 3 times a day has beneficial effect in amoebic dysentery especially the chronic form. It has proved effective against trichomona infestations.

Holarrhena febrifuga Klotizseh

Grows in Kenya, Tanganyika, Northern Rhodesia and Nyasaland. Used in the treatment of influenza, bilharzia, syphilis and also as substitute for quinine. Stem bark and leaves contain conessine 6.0 per cent and a subsidiary norbase isoconessiomine. Further studies indicated.

Hydnocarpus anthelmintica Pierre.

It grows in Siam, Northern Cochin and Gamboja

Hydnocarpus wightiana Blume (Vern.—Janglibadam, Kowti, Bo-Kava, M.-Yetti). B P., I P.C & I P L

Grows in western parts of the Indian Peninsula from South Konkan along the coastal range. The oil has been used in the treatment of leprosy for centuries Seeds contain Chaulmoogra oil and Palmitic acid. Chaulmoogra oil has a bacteriostatic action on acid fast bacilli It is extremely irritant to the tissues and for this reason ethyl esters such as moogrol (British) and Antileprol (German) are used by injection in the treatment of leprosy

Hyoscyamus niger Linn. (Vern —S -Parasikaya, H -Khurasani-ajvayan), B -Khorasani ajowan, Bo -Khorasani-owa, M -Khorasani-yomam) B P, B P C & I P C

Grows wild in temperate Himalayas at altitudes of 6,000 to 12,000 ft and also cultivated. Leaves contain alkaloids hyoscine and hyoscyamine

Ipomoea hederaceae Jacq & **I turpethum** Br (Vern —H, B & Bo-Kaladana, M -Jirkivirai) B.P C, I P C & I.P.L

Found throughout India ascending to altitudes of 3,000 ft The resinous substance from the root bark is an excellent substitute for Jalap which is a drastic purgative It is official in the I P L

Juniperus communis Linn. (Vern. H -Aaraar, P -Petthri) I.P C

Found in the Western Himalayas, Kumaon and Kurram valleys at an altitude of 11,000 ft above the sea level It is used as digestive and diuretic. Berries contain a voltaile oil 0 2 per cent, invert sugar about 33 per cent, resin 10 per cent, a bitter principle, organic acids and wax Beverage gin is alcohol flavoured with juniper berries or the essential oil

Luffa acutangula Roxb. (Vern. S -Koshataki, H & Bo -Torai, B.-Jhinge, M -Pikumkai)

Grows in N W India, Sikkim, Assam and East Bengal and also cultivated Leaves used locally in splenitis, haemorrhoids, leprosy and granular conjuctivitis Fruit contains a bitter substance luffein and seeds contain a fatty oil and a saponin. The latter is toxic to frogs and has a haemolytic action. It shows digitalis-like action and produces vomiting and diarrhoea. Further work is indicated

Luvunga scandens Ham. (Vern.—Jivanti, S -Lavangalata, B-Labangaphal).

Grows in Eastern Bengal, Assam, Khasia hills, Chittagong & Burma Roots and berries are used to cure tuberculosis of lungs, billiousness

and fevers. Berries contain four crystalline neutral substances. Further chemical and pharmacological investigations are indicated

Madhuca indica J. F. Gmel. Syn -*M. latifolia* Mcbrd. The Mahu tree. (Vern -Mohua). I.P.C.

Grows in forests of Madhya Pradesh and is cultivated all over India. Also found in Uttar Pradesh, Bihar, Gujrat and Bombay Its flowers, seeds and timber are of economic value The seed-oil is edible and is also used for soap manufacture. The seeds contain 50 to 55% of a fatty oil and a saponin Leaves contain a glucosidic saponin and traces of an alkaloid. Flowers contain sugar and enzymes The plant is used as an astringent It is largely employed as a lotion for chronic ulcers and bleeding spongy gums. Also considered beneficial in chronic bronchitis and chronic rheumatism. No proper clinical trials have been carried out.

Madhuca longifolia Linn. Macbd (Vern.—Mohua) Syn -*Bassia longifolia.* I.P C

Is found in forests of Western India, Kanara, Malabar and Mysore in the same way as of *Madhaca latifolia.* Seeds contain 40 per cent. of fatty oil and sapo-glucoside called 'Mowrin' Fruit contains saccharose 4 6 to 16.2 per cent. and maltose 2.39 per cent, tannins and enzymes. Acts in the same way as *M. latifolia* The sapo-glucoside acts on the heart in the same way as digitalis. Requires further investigation

Mahonia nepalensis DC. Syn.-*Berberis nepalensis* Spreng (Vern.—Chiror Anrudana, P.-Amudanda, Nep.-Chatri)

Grows in the outer Himalayas from Ravi eastward to Khasia and Naga Hills also in the Nilgiris at an altitude of 5,000 ft It contains umbellatine

Mallotus philippinensis Muell -Arg (Vern —Kambila, S -Rechanaka, H. & B.-Kamala, Bo -Shendri, M -Kapila) I P C

Grows throughout the plains of India and Ceylon, tropical parts of Asia and Australia, Bombay and Bengal It is used as anthelmintic especially against tape worms Fruit contains a brownish-red resin called rottlerin, an impure rottlerin, traces of a volatile oil, starch, sugar, tannins and oxalic acid. It has toxic action on frogs, tadpoles and worms. The drug has a marked cathartic and anthelmintic action in doses of 2 to 3 drams.

Melia azedarach Linn. (Vern.—Drek)

Grows wild in Sub-Himalayan tract at altitudes of 2,000-3,000 ft and is also cultivated Root bark, fruit, flowers and leaves are considered hot, dry and to have deobstruent and resolvent properties.[5] Juice of leaves used as anthelmintic, diuretic and emmenagogue It contains a resin and the fruit a bitter substance. No systematic phamacological studies or clinical trials have been carried out

Mentha arvensis Linn (Vern.—H.-Podina, B. & Bo.-Pudinah. M.-Pudina) The marsh mint B.P., B P.C , I.P C. & I.P.L

Grows abundantly in northern and western Himalayas and in Kashmir at altitudes of 5,000 to 10,000 ft It is used as a flavouring agent and as carminative and stimulant Yields an oil similar to peppermint oil, to the extent of 0 18 to 0 2 per cent The oil contains 4 to 14 per cent. esters as menthyl acetate and 46% of free menthol Official in I.P.L

Moringa oleifera Lam Syn -*M pterygosperma* Gaertn. (Vern — Sanjna, Saonjna). I P C.

The plant is found wild in the Sub-Himalayan tract from the Chenab to Oudh and is also cultivated throughout India The root of this tree is extensively employed in intermetent fevers, epilepsy, hysteria, palsy, chronic rheumatism, dropsy etc The root contains physiologically active bases and an antibiotic substance pterygospermin

Myristica fragrans Houth (Vern —S -Jatifalam, H , B. & Bo.-Jayphal, M -Jadikkay). The nutmeg B P , B P C , I.P.L & I.P C.

Grows in the Nilgiri hills and on the Malabar coast Oil is used in the manufacture of pharmacopoeial preparations and aperient pills to prevent griping Nutmegs yield 5 to 15 per cent of a volatile oil and 30 to 40 per cent of fats, also phytostirin, starch, amylodextrin, colouring matter and a saponin. It is largely used for flavouring and as a carminative.

Myrsine africana Linn (Vern Gugul, H. Chapra).

Grows in Afghanistan, salt range and the Himalayas from Kashmir to Nepal at altitudes from 1,000 to 8,000 ft. Berries used as anthelmintic and as a remedy for skin diseases They contain embellic acid 3 per cent. and quercitol 1 per cent No pharmacological work or clinical trials have been carried out

Oldenlandia auricularia Schum Syn -*Hedyotis auricularia* Linn. (Vern.-Gatta colla, B.-Muttia-lata)

Grows in Eastern Bengal and from Nepal, Sikkim and Khasia hills to Assam, Chittagong, Manipur and Burma. Also found in Kanara and Ceylon Used in the treatment of dysentery and diarrhoea Roots contain a fatty oil and glucosides, also reducing sugars, colouring matters, tannin, alkaloids auricularine, heydyotin and albumin No pharmacological work has been done.

Papaver somniferum Linn. (Vern —S -Ahiphena, H & B -Afim, Bo -Aphu, M -Postakatol). The Opium B.P., B P C , I P C & I P.L.

Cultivated in many parts of India especially in Utter Pradesh, Bihar and other parts of the world, China, Asia Minor, Turkey, Persia and Egypt. Dried inspissated juice obtained by incising the green fruit is opium which is used in the treatment of dysentery and diarrhoea as an anodyne sedative and euphoric Opium contains about 25 alkaloids, the important ones being morphine, codeine, thebaine, papaverine and narcotine In addition to these acetic, lactic, sulphuric and meconic acids, gummy and pectinous substances, albumin, wax, fat, resin, etc. also occur.

Opium is a soverign remedy for relieving pain and producing sleep. Opium and morphine are habit forming drugs and produce addiction

Peganum harmala Linn (Vern --H. & Bo.-Hurmal, B.-Isband, M.-Shimai-azha-vanai-virai) I.P C

Grows wild all over N.W India, Sind, Punjab and Kashmir, Agra and Western Deccan Also found in Arabia, North Africa, Hungary and Spain. Seeds are used as alterative, aphrodisiac, lactagogue and anthelmintic. Contain alkaloids harmine, harmaline and harmalol to the extent of 4% The alkaloids have some anthelmintic action and depress respiration and heart Clinical trials revealed no effect in malaria. The seeds have been used to expel tape worms

Peucedanum graveolens Benth (Vern --S -Shatapuspi, B.-Soolpha, Bo -Balunt-shep, M -Satakuppi)

Grows in central and southern Europe and in tropical and sub-tropical countries. In India, it is cultivated as a cold weather crop. Used as a condiment, carminative, digestive and flavouring agent Largely used in soap manufacture as a perfume Yields 0.06 per cent. of an essential oil

Picroena quassioides Benth. (Vern Bharangi) I P C & I P L.

Found in the outer Himalayas from Kashmir to Nepal and also in China. Bark and leaves used as febrifuge and insecticide. Contains bitter principles quassin and neo-quassin and a bitter alkaloid 0.05 per cent. Quassia is a popular bitter

Picrorhiza kurrooa Benth (Vern -S -Katuka, H & B -Katki, Bo -Kalikutki, M -Katuka-rogani). B P.C , I P C & I P.L

Grows in the North West Himalayas from Kashmir to Sikkim at altitudes of 5,000 to 11,000 ft. Used as a bitter tonic and stomachic. Contains 26 6 per cent. of a bitter substance and a glucoside Can be used in medicine as a bitter if properly standardised.

Pimpinella anisum Linn. (Vern.—S -Shetapuspa, H.-Saonf, B.-Muhuri, Bo.-Sonf, M.-Shombu). The Anise B P , B P.C. & I.P C.

Grows in Europe, Russia and Middle East and many other parts of the world In India, found in Uttar Pradesh, the Punjab and Orissa. Used to prevent flatulence and intestinal colic and as an aromatic. It contains an essential oil which is used in medicine to prevent flatulence, intestinal colic and as a flavouring agent.

Pinus roxburghii Sargent Syn.-*P longifolia* Roxb (Vern -Chir, S -Sarala) Chir Pine. B.P , I.P C. & I.P L

Grows in abundance in U S.A. and France. In India, it is found in the temperate Himalayas from Kashmir to Burma at altitude from 2,000 ft. to 6,000 ft. The oil is used in the manufacture of paints and varnishes and colophony for plasters in medicine The oleoresin yields about 20 per cent. of turpentine oil and about 80 per cent. of residue named as colphony which is used in medicine for preparation of plasters and ointments. Oil of turpentine is used externally as a counter-irritant

and rubefacient. Small doses of oil are given internally in bronchitis and larger doses as an anthelmintic.

Piper betle Linn. Betel leaf. (Vern.-S.-tambula, H., B. & Bo.-Pan, M.-Vettilai) I P C.

It is cultivated in Madras, Central Provinces, Bengal, Orissa, Bombay, U. P. and Burma. Leaves are used as an aromatic, stimulant, carminative, astringent and aphrodasiac Contain an essential oil, starch, sugar, tannins and diastases No pharmacological studies have been carried out Leaves with other substances such as betel nut, lime, catechu, etc. are widely chewed in India They act as mental stimulant and digestive

Piper cubeba (Vern.—S -Sugandha muricha, H., B. & Bo.-Kababchini, M -Val milaku) Cubebs. I P.C & B P.C

Found in Java, Sumatra and Malaya Archipelago and cultivated to a small extent in India in Mysore Fruit is used as a condiment and in the treatment of genito-urinary diseases, cystits, gonorrhoea and gleet Contains an essential oil upto 10 15 per cent.

Pistacia integerrima Stew (Vern —Kakra, S -Karkata sringi, H & B.-Kakra shingi, M -Kakkata shingi). I P C

Is found in the sub-alpine Himalayas. It is used as a remedy for cough, phthisis and asthma in doses of 20 grs combined with aromatics Galls contain an essential oil 1 21 per cent a crystalline hydrocarbon 3.4 per cent tannins and gum mastic 5 0 per cent No systematic investigations have been carried out Further clinical trials are needed

Plantago ovata Forsk. Ispaghula (Vern.—H -Ispaghul, B -Isabgul, Bo.-Isabghol, M.-Ishappukol-virai). B P C , I P.C. & I P L.

Grows in the plains of the Punjab and Sind and low hills from Sutlej westwards It is also cultivated in Bengal, Mysore and Coromandel Coast Seeds are cooling and demulcent and are used in dysenteries, diarrhoea and other inflammatory conditions of digestive and urinery tract. Contain a fatty oil, albuminous matter and mucilage Some species contain a glucoside named aucubin, which is pharmacologically inactive. The mucilage from seeds inhibits growth of common intestinal organisms in the gut The colloidal nature of the mucilage has a remarkable power of adsorbing bacteria and toxins and is soothing. The seeds are prescribed in chronic bacillary and amoebic dysentery, chronic constipation and chronic diarrhoea in doses of 1—2 ounces soaked in water. The pericarp of seeds separated is more convenient for use and is taken in doses of 2 to 3 teaspoonsful once or twice daily.

Plumbago indica Linn Syn.-*P. rosea* Linn. (Vern.-S.-Chitraka, H., B. & Bo.-Lal chitra).

Commonly cultivated in gardens of India. Root is used as abortifacient and vesicant in rheumatic affections of joint and paralytic conditions Contains, plumbagin, the active principle, amorphous brown pigment and a reducing sugar. No systematic pharmacological investigations have been carried out.

Plumbago zeylanica Linn. (Vern.—S.-Chitraka, H. & B.-Chita, Bo.-Chitaro, M.-Chittira)

Grows throughout India, particularly in Uttar Pradesh, Bengal and Southern India. Root is used in digestive disorders, piles, anasarca and skin diseases and as abortifacient It contains an active principle named as plumbagin, which stimulates the central nervous system, heart and plain muscles in small doses Larger doses have a depressant action, Systematic clinical trials are needed to establish its therapeutic value.

Podophyllum hexandrum Royle. (Vern.—H.-Papra). B.P., B.P.C., & I.P.C.

Grows in the temperate forests of the Himalayas from Sikkim to Kashmir at a height of 7,000 ft Used as a drastic purgative and as a cholagogue Contains a resin 8 to 13 per cent, flavonol, quercetin, starch and calcium oxalate. Podophyllum is irritant to the eyes and mucuous membrane. It is an active purgative and is administered in average doses of 0.01 gm.

P. paltatum contains podophylotoxin and α & β paltatins, the farmer has been shown to be present in *P. hexauclum*, but not paltatins. The resin is effective in destroying soft warts or condylomata.

Pongamia pinnata Merr. Syn.-*P. glabra* Vent (Vern —Kanga, S., H. & Bo -Karanja, B.-Dahar karanja)

Grows all over India especially near the Coast, from Central and Eastern Himalayas to Ceylon The seeds and leaves are used in treatment of skin diseases and rheumatism Internally the seed oil is used as stomachic, cholagogue, febrifuge and expectorant It is bitter fatty oil forming 27 to 36 4 per cent. of seeds containing traces of an essential oil It also contains two crystalline compounds named as karanjin and pangamol No systematic pharmacological investigations or clinical trials have been carried out

Premna integrifolia Linn. (Vern.—S.-Ganikarika, H. & Bo.- Arni, B.-Ganiari, M -Munni-vayz)

Grows near the sea from Bombay to Malacca and in Ceylon. Root is used as laxative, carminative and stomachic. The decoction of whole plant is used in the treatment of fevers and rheumatism and neuralgia. Stem bark contains three alkaloids, premine, ganiarine, ganikarine and some unsaturated aromatic hydrocarbons The alkaloids ganiarine and premnine have a sympathomimetic action Further work is indicated.

Pristimera indica Willd Syn.-*Hippocratea indica* Willd.

Grows wild in forests from Konkan to Madras in South Bengal and Assam. Paste from roots used as a remedy for respiratory troubles Root contains dulcitol and an antibiotic pristimerin which is effective against gram positive organisms Preliminary clinical trials revealed that pristi merin is effective against throat affections Further investigations are in progress.

Psoralea corylifolia Linn. (Vern —S -Vakuchi, H. & B.-Babachi, Bo -Bobawachi, M.-Karpo-Karishi). I P.C & I P L.

Grows all over the plains of India. The seeds are considered anthelmintic, diuretic, diaphoretic and a remedy against skin diseases and leprosy. They contain an essential oil a fixed oil, a resin and traces of an alkaloidal substance. The oil has an irritant action on skin. It is

toxic to paramoecia and bacteria Plain muscle is stimulated and aretenoles are dilated An oleoresinous extract made from seeds has beneficial effect in leucoderma when applied locally. Seeds are also taken internally in this affection.

Randia dumetorum Lamk. (Vern.—S.-Madan, H.-Maniphal, B -Menphal, Bo.-Gelaphal, Maruk-kallan-kai).

Grows throughout India. Fruit is used as an emetic and aperient and as a substitute for ipecacuanha Contains a small quantity of an alkaloidal substance, Randia saponin and a glucoside. Randia tannic acid and Randia fat are also present. The drug produces irritation of the mucous membrane and haemolysis both in vitro and in vivo. Frog's heart is arrested when perfused with drug solution in concentration of 1 in 50,000. No clinical trials have been carried out.

Rauwolfia canescens Linn

Grows wild in Howrah district near Calcutta in Bengal. Roots used to adulterate those of *R serpentina* Root bark stem bark, and leaves contain an alkaloidal body named as rauwolscine The alkaloid is depressant to the cardio-vascular system It is also sympatholytic in action and abolishes the pressor effects of adrenaline Further work is in progress

Rauwolfia serpentina Benth. (Vern —S.-Sarpagandha, H -Chota chand, B. & Bo -Chandra, M.-Covannamilpori) B.P.C , I P.C. & I.P L

Grows near the foot of hills from Moradabad to Sikkim, in Assam, Pegu, in Southern India along the Ghats , also occurs in Java and Malaya. Root is used as an antidote in snake bites and as a remedy for insomnia, hypochondria and insanity It contains alkaloids, ajmaline, ajmalinine, serpentine and serpentinine Extracts containing the total alkaloids, including serpentine, lower blood pressure in animals , ajmaline and serpentinine raise it Recently a new alkaloid, Reserpine, has been isolated which has a marked sedative & hypotensive action. Doses of 20 to 30 grains of powdered root produce sedative effect and lowers blood pressure especially the diastolic. Considerable work is being carried out on this drug in Europe and America on account of blood pressure lowering properties and sedative effects

Rheum emodi Wall (Vern —H & B -Revandchini, Bo -Iadakirevanda chini, M -Nattu-ireval-chinni) Indian Rubarb I P.C. & I.P L.

Grows wild in the Himalayas in Nepal and Sikkim at altitudes of 4,000 to 12,000 ft Used in ailments of children and as a purgative Contains derivatives of anthraquinone to the extent of 2.0 to 4.5 per cent gallic acid, tannin, starch, fat, dextrose and levalose, pectin and calcium oxalate

Ricinus communis Linn (Vern.—S.-Eranda, H.-Arand, B -Verenda, Bo.-Erendi, M -Amanakham chedi) Castor seeds. B.P., B.P.C. & I.P.C.

Cultivated throughout India particularly in Madras, Bombay and Bengal Seeds contain a fixed oil which consists of ricinoleate of glycerol with a small quantity of palmitin and stearin and a toxic substance ricin. Oil from seeds is used as a purgative

Rosa damascena Mill. (Vern. -H.- Gulab ka phul, S.- Satapatri, B.-Golapphul, Bo.-Gul, M.-Golappu). The Rose. B.P. & B P.C.

Chiefly cultivated in Bulgaria In India it is cultivated in the Punjab, United Provinces, Bihar and Orissa Rose water is used for eye lotions and the oil as a flavouring agent Flowers contain a pleasant smelling essential oil used as perfume, and fruits contain Vit. C.

Santalum album Linn. (Vern —S -Swet-chandan, H.-Safedchandan, B.-Sadachandan, S -Mhandanak-kattai). B P., B. P. C & I. P. C.

Grows wild and is cultivated in Mysore State, Coorg, Coimbatore and Southern parts of Mysore. Wood is used as bitter, cooling, astringent and useful in biliousness, fever and thirst. Paste made from wood as a cooling application for skin affections. The heart wood of the tree yields an essential oil 2 5 to 6 per cent which is used for flavouring purposes and as urinary disinfectant

Saraca indica Linn. (The Asoka tree) Vern —S -Asoka, H , B. & B.-Asok, M -Asek) I P C.

Grows in Bengal, South India, Arakan, Tenasserim and is also cultivated in many parts Bark is used as astringent, uterine sedative in menorrhagia and as a remedy for piles and dysentery It contains tannins and catechol. Various fractions isolated from the bark produced no marked action on uterus but faith in its beneficial effects in uterine disorders persists.

Saussurea lappa Clarke Comp The Costus (Vern – S -Kushtha, H.-Kut, B.-Pachak, Bo -Ouplate, M -Goshtam). I.P C & I.P.L.

Grows in N W Himalayas especially on the slopes of mountains round the Kashmir valley upto an altitude of 13,000 ft. Root is used as hairwash to kill lice and as insect repellent, carminative, stimulant and antiseptic Root contains an essential oil, 1 5 per cent., an alkaloid named as sausserine, resin 6 0 per cent , traces of a bitter substance, tannin, inulin 18 per cent, a fixed oil and potassium nitrate Leaves contain only the alkaloid The essential oil has strong antiseptic and disinfectant properties. The circulatory system is stimulated and smooth muscle of bronchi and intestines is relaxed The alkaloid produces relaxation of bronchioles and has a general depressant action in involuntary muscles The heart is stimulated An alcoholic extract of root in 1/2 to 2 dram doses relieves asthmatic attacks

Scilla indica Baker (Vern.—H. & B -Suphadie khus, Bo.-Bhui-kanda, M -Shirunari-vengayam).

Grows frequently in sandy places near the sea in the Deccan Peninsula from the Concan and Nagpur southwards Used as expectorant, cardiac stimulant and diuretic. Squill contains a number of cardiac glycosides Clinical trials have revealed that it has beneficial effect on patients suffering from bronchial catarrh and chronic bronchitis

Semecarpus anacardium Linn. The marking nut tree (Vern —S.-Bhallatamu, H & B.-Bhela, Bo.-Biba, M.-Shayrang)

Grows in Sub-Himalayan tract from Sutlej eastwards down to Assam at an altitude of 3,500 ft. Juice is used in preparation of a varnish, fruit is used as a substitute for marking, counter irritant in rheumatism, sprains

and leprotic nodules Internally juice is used in syphilis, scrofulous affections, piles and nervous debility. The pericarp of the fruit contains 20 per cent. of an oil, which gives bhilawanol and other compounds No systematic investigations have been carried out to determine its beneficial effects in treatment of disease.

Sida cordifolia Linn. (Vern —Chareti, S -Bala, H -Kungyi, B.-Brela, Bo -Chikana, M.-Chiribenda). I P C.

Grows throughout tropical and sub-tropical India and Ceylon. Root is used as cooling, stomachic, tonic, febrifuge and diuretic The seeds are considered aphrodisiac and are also used in the treatment of cystitis, rheumatism and spermatorrhoea. The seeds contain fatty oil, and an alkaloid (0 085 per cent) recognised as ephedrine, which probably is responsible for its cardiac stimulant effects.

Skimmia laureola Sich & Zucc (Vern -Bassu, Nep.-Chumlani, P.-Ner)

Grows throughout temperate Himalayas from Kashmir to Khasia hills The leaves are used as an incense and burnt near smallpox patients Leaves contain an essential oil with pleasant smell and an alkaloidal substance. No systematic pharmacological studies have been carried out. The essential oil could be used as perfume in soap and cosmetic industry.

Sonneratia acida Linn (Vern -B -Archaka)

Grows in Bengal and the Deccan Peninsula. Used as a poultice in sprains and swellings Juice is used for stopping haemorrhage Contains colouring matter, archin and archinin and a crystalline compound archicine. No pharmacological studies have been carried out

Stephania glabra Roxb. Miers (Vern -Pusha)

Grows in tropical and temperate Himalayas ascending to an altitude of 7,000 ft from Sindh eastwards to Khasia hills and Pegu Root is used as a remedy against phthisis, asthma, dysentery, fevers and intestinal complaints. Tubers contain three alkaloids, gindarine, gindaricine and gindarinine. No pharmacological and clinical studies have been carried out.

Strychnos nux-vomica Linn. (Vern —S -Visha-mushti, H -Kuchla, B -Kuchila, Bo -Kajra, M.-Yetti) B P., B P.C , I P C & I P L

Grows wild throughout tropical India upto an altitude of 4,000 ft in Orissa, Madras, Cochin , Travancore and the Coromandal Coast Seeds are used in the treatment of dyspepsia and diseases of the nervous system Fruit, bark, leaves and wood contain strychnine, brucine, vomicine, etc Seeds contain 1.53 to 3.42 per cent. of the total alkaloids of which half is strychnine

Swertia chirata Ham. (Vern.– S -Kirata, H -Charayatah, B -Chireta, Bo.-Chiraita, M.-Nila-Vembu) Chiretta. B.P C., I.P C & I.P.L.

Grows abundantly in the temperate Himalayas from Kashmir to Bhutan and Khasia Range between altitudes of 4,000 to 10,000 ft. Used as a bitter tonic, stomachic febrifuge and anthelmintic. Contains a bitter glucoside chiratin, resins, tannin and ash 4 to 8%.

Symplocos racemosa Roxb. (The Lodh tree) Vern —S -Lodhra, H. B. & Bo -Lodh, M.-Ludduga). I.P.C.

Grows in plains and lower hills of Bengal, Assam and Burma. It is also found in dry forests of Chhota Nagpur plateau Bark and leaves are used for dyeing purposes. The bark is used as astringent in bowel complaints, eye diseases and ulcers Bark contains three alkaloids, loturine 0.24 per cent. collutrine 0 02 per cent and loturdine 0 06 per cent No systematic pharmacological investigations or clinical trials have been carried out.

Terminalia arjuna W. and A. (Vern.—S & Bo -Arjuna, H & B - Arjun, M.-Vellai-maruda-maram). I P C.

Grows throughout the Sub-Himalayan tracts of United Provinces and in the Deccan, Southern Bihar, Chhota Nagpur, Burma and Ceylon Bark is used as a cardiac tonic in heart diseases and contains large quantities of calcium salts, about 12 per cent. tannins, an organic acid, an ester and some colouring matters and sugar. It is reputed to have a stimulant action on heart Clinical trials however showed no beneficial effects in heart disease. Further investigations needed

Thalictrum foliolosum D C. (Vern —H -Pinjari, P -Gurbiani, Bo.- Mamiran).

Grows in Khasia hills between altitudes of 4,000 ft to 6,000 ft. It is used as a bitter tonic and laxative. It is a cheap but valuable substitute of Mamira used in preparation of eye solves It contains two alkaloids berberine and thalictrine No proper investigations have been carried to study its efficacy in conjunctive affections

Thevetia peruviana Schum Syn -*T nerifolia* Steud See poisonous plants of India (Vern -H & Bo -Pila-kaner, B -Kolka-phul M -Pachch-ai-alari)

Grows in plains all over India, but originally a native of west Indies. Seeds are used as abortifacient and as poison for man and cattle They contain 57 per cent of a colourless oil, which yields glucoside thevetin which is not toxic to unicellular organisms The drug is toxic to higher animals and is not likely to be of therapeutic value because of powerful toxic effect on heart muscle

Tinospora cordifolia Miers (Vern – Giloe, S -Guduchi, H & B - Gulancha, Bo -Gulwail, Bo -Gulwail, M -Sindilkodi) I P C & I P L

Grows in Uttar Pradesh It is used in treatment of rheumatism hyperacidity and dyspepsia and as a tonic, antiperiodic and diuretic. Stems contain glucoside giloin and non-glycosidic bitter, gilenin and gilosterol No Pharmacological investigations or clinical trials have been carried out

Toddalia asiatica Lam. Syn -*T aculeata* Pers. (Vern —S -Kanchana, H -Kanj, B.-Koda-todali, Bo.-Jun-li-kali-mirchi, M Milkaranai)

Grows in the Nilgiris and sub-tropical Himalayas from Kumaon to Bhutan upto an altitude of 3,000 ft. Root bark is considered to be antimalarial. The plant contains two alkaloids, todaline and todalinine. Leaves contain an essential oil and root bark contains an essential oil;

Vitex peduncularis Wall. (Vern —H.-Nagbail, B.-Goda, M.-Navaladi). I.P.C.

Grows in Bihar, Eastern Bengal and Madhya Pradesh. The leaves and roots are used in the treatment of malarial and black water fevers Leaves contain a glycoside. Clinical trials with infusion of leaves showed no beneficial effect in malaria or black water fever.

Withania somnifera Dunal (Vern —S., B. & Bo -Ashwagandha, H - Asgandh, M -Amku lang-kalang) I.P.C.

Grows throughout the drier parts of India, Baluchistan and Ceylon. Leaves and roots are used in the treatment of tumours tuberculus glands, bronchitis, rheumatism and dyspepsia The plant contains pot nitrate, tannin, colouring matter, glucose and an alkaloid. It has a mild sedative effect on animals Deserves further study

Xanthium strumarium Linn (Vern —S -Aristha, H Chhota-gokru, B -Bon-okra, Bo -Shankeshvara, M -Marlu-mutta) I P C

Grows throughout the hotter parts of India upto an altitude of 7,000 ft. The whole plant is used as diaphoretic and sedative Root is used as bitter tonic and in the treatment of cancer and strumous diseases. It contains fat 38.6 per cent., albuminoids 36 6 per cent and a glycoside Xanthostrumanin 1 3 per cent The glucoside is physiologically inactive. No clinical trials have been carried out.

Zingiber officinale Rosc. (Vern —S.-Adrakam, H -Adrak, B -Ada, M.-Inji) B.P & I.P C

Cultivated in Cochin, Bengal, Bombay, Kumaon and many other parts of India Used as a condiment in food and as carminative and stimulant of the gastro-intestinal tract. Contains 0 25 per cent. of a volatile oil of light yellow colour, resinous matter, starch and mucilage.

CHAPTER VII

I. TOXICOLOGICAL ASPECTS OF INDIAN PLANTS

The second line of basic research has been in connection with the Poisonous Plants of India including the group of insecticides, insect repellent etc Here we will briefly refer to the present position with regard to the toxicological aspects of Indian Plants.

(1) CRYPTOGAMS OR THE FLOWERLESS PLANTS

The toxicological aspects of the Cryptogams are little known so far as India is concerned

(a) **Bacteria.** The bacteria are among the simplest form of plant life and are met with universally. The majority of them are harmless, but some are injurious to man and animals They produce deleterious effects in two ways —Firstly as parasites, when they derive nourishment from living animals and many of them produce, within the body, toxins which are harmful Secondly many saprophytic bacteria produce poisonous substances, especially such as those occuring in putrid flesh, fish and other decaying organic matter It is not our intention to give details of toxic properties of this group These are fully discussed in books on bacteriology Bacteria are a class by themselves and although they belong to vegetable kingdom do not come under our purview here.

On the other hand a number of organisms of this group produce antibiotic substances which are of very great value in the treatment of disease Streptomycin has been derived from *Streptomyces griseus* (*Actinomyces griseus*), Aureomycin from *Streptomyces aureofaciens*, Terramycin from *Streptomyces rimosus*, Chloromycetin from *Streptomyces veneznelae*, Bacitracin from strains of *B. subtilis*, etc.

A large amount of work is now being done in this country on the isolation of antibiotic substances from various soil and other micro organisms found in this country.

(b) **Algae** The algæ that cause poisoning are mostly those which are found in stagnant waters. The normally offensive odour may be sufficient to indicate their presence, but only a microscopic examination can determine just what the forms of algæ present may be. Blue-green algæ, as a group, are perhaps the most pronounced in their toxic effect. Parker and other workers have shown that when odours in water are pronounced, these microscopic organisms are present in considerable numbers He claims that of the organisms which produce objectionable and deleterious qualities in water, the microscopic ones are the more important and very few cases have been observed in which really serious trouble in water supplies could be attributed directly to the growth of larger plants In any study of the algæ from this point of view, however, account must be taken of the products of decomposition by the associated bacteria, since poisoning may be produced by the toxins produced by bacteria rather than by the algæ.

Certain algæ, such as *Microcystis flos-aquae* (Wittr.) Kirch, *Aphanizomenon flos-aquae* (Linn) Ralfs. and species of Anabœna, etc. form on the surface of water what is generally called water bloom The presence of water bloom on the surface of lakes, ponds, and other open sheets of water is distasteful to bathers and obnoxious to those living in the vicinity. Livestock compelled to drink water containing water bloom are reported to have suffered from poisoning. In Minnesotta, (U.S A.) during recent years, horses, cattle, sheep and donkeys have died in large numbers on the shores of lakes where water bloom is present. All the above mentioned algæ forming water bloom have been recorded in various parts of India but no work has been done in connection with their toxic effects. According to Dr Bhardawaja of the Benaras Hindu University, water blooms containing these species occur commonly on the surface of many temple tanks in different parts of India Of the other possibly harmful algæ may be mentioned species of *Nodularia, Clathrocystis, Nostoc, Oscillatoria, Pandorina,* and *Volvox* when present in large numbers.

The question of growth of algæ in water reservoirs leads us to a very important public health problem Although in India very little information is available about the contamination of the water supplies with the group of toxic algæ, the important question of checking their growth in the reservoirs of water supplies needs study One of the essentials of the algal growth is light This growth may, therefore, be prevented, or at any rate considerably reduced, by covering up the reservoirs and cutting off sunlight Most of the reservoirs for the supply of water to both animals and man, however, in India are generally not covered and are often largely contaminated with algal growth The removal of organic matter by keeping the source of water supply in as pure a state as possible will not doubt keep down the algal growth It must be understood, however, that nearly all water contains sufficient organic matter for the growth of algæ, especially the water coming from water-sheds Growth of algæ can also be successfully prevented by additions of copper sulphate in dilutions of one in five millions or even more Such dilutions do not render the water deleterious to man and animals The problem of toxic algæ is important and deserves the attention of workers in this field It is also possible that some of these algæ may contain active principles having therapeutic properties in the treatment of disease This aspect has yet to be investigated.

(c) **Fungi.** (i) Some fungi live on the skin and mucous membranes of man and animals and cause various, diseases, e g. ringworm, thrush, etc.

(ii) There are others which attack foodstuffs and among these may be mentioned —

(1) **Smuts** Many of these are destructive parasites which invade plants of vital economic importance on account of their food value, such as oats, millet and other cereals Some are supposed to be piosonous if taken in large quantities, and others are said to produce irritation of the mucous membranes There is difference of opinion with regard to the injurious effects produced by particular kinds of smut and hardly any authentic information is available regarding those occuring in India. The subject deserves the attention of mycologists.

(2) **Rusts.** Annual reccurrence of the outbreaks of rust attacks of cereals in India, especially those attacking wheat, is of great economic importance to the country. These, especially the uredo stage, produce

inflammation of the mucous membrane of the mouth and nose. The dust coming from the infested straw when the grain is thrashed is stated to cause serious disturbances of the respiratory tract of man and animals. Very little information is available about the Indian strains.

(3) **Ergot**, which grows on rye, is a well known example of a fungus which produces highly poisonous substances. Some species of this fungus grow on wild grasses in India and Ergot itself has been grown in this country for medicinal purposes.

(4) The poisonous nature of the seeds of darnel (*Lolium temulentum* Linn.), a grass and annual weed cultivated especially in northern India, is believed to be due to a fungus, and cases of poisoning due to admixture of the seeds with wheat grains are not infrequently reported in India and abroad. Cases of death among livestock have also been reported.

(5) **Moulds**. Very variable data are available as regards the poisonous effects of mouldy food stuffs in India, but there appears to be little doubt that the presence of certain species may occasionally produce harmful effects in man and animals Species of *Mucor, Aspergillus, Penicillium* and *Fusarium*, etc. deserve special investigation in this connection. It appears, however, that there is an appreciable difference in the susceptibility of different species of animals to the effects of mouldy foodstuffs. In general it has been stated that horses, dogs and pigs are more susceptible than ruminants and poultry, while in other animals the case may be the reverse. Very little information is available about the toxicity of moulds occurring in India and the problem requires a thorough investigation because of its great economic importance In the meantime it would be safer to consider all fungus-infected food-stuffs as deleterious Acute poisoning with the moulds is rarely met with and if they are taken in small quantities there is hardly any danger Mouldy food should however be avoided It is worthy of note that some of these fungi are the source of powerful antibiotic substances such as penicillin from *Penicillium notatum*, fumigaen from *Aspergillus fumigattus*, calvicin from *Aspergillus clavatus*, etc. A large amount of work is now being done in this country in connection with antibiotics from local strains of these organisms.

(iii) **Mushrooms or fleshy fungi** The third group of the poisonous fungi belongs to the mushroom class A number of these are edible and many occurring in India are indiscriminately eaten by people and if properly cooked few produce serious toxic effects. Cases of fungus poisoning, however, are not infrequently met with, particularly in the hills. Unfortunately very little information is available about the poisonous fungi growing in this country and inspite of numerous cases of poisoning, little attention has been paid to the subject.

Stropharia semiglobata (Batsch) Quel. from Khasia hills, *Hypholoma fasiulare* (Huds) Fr. from Darjeeling and Simla and *Lactarius vellereus* Fr. from Sikkim are regarded as poisonous. There is also evidence on record that there exists in Bengal a fungus which closely resembles an edible variety but which contains amanitine or muscarine, the poisonous principle of the foreign *Amanita muscaria* Pers. There are probably many more poisonous species that have really been incriminated as poisonous, but on the whole their number may be small and indeed if properly cooked

only a few are dangerous. If washed in water and macerated in vinegar before cooking, and if eaten with plenty of bread there is almost no danger in most cases. The safest method, however is to learn to recognize the edible species and never to eat a fungus until its identity is certain.

Some of the foreign poisonous fungi, e g *Lepiota cristata* Quel. *Volvaria gloiocephala* Gill , *Amanita muscaria* Pers. and *Amanita phalloides* Secr. are well known. The last-mentioned is responsible for perhaps 90 per cent. of the deaths caused by fungus poisoning in Europe, Great Britain and U.S A. During the World Wars, when food scarcity became acute in Germany and Austria, poisoning from fungi appreciably increased.

According to Ford there are four main types of mushroom intoxication —(1) Gastro-intestinal type in which the attack ceases when the stomach is emptied (2) General catharsis which is painless. (3) Violent vomiting and pain but no involvement outside the gastro-intestinal tract. (4) Choleriform type producing widespread degeneration of cells With regard to edible fungi it may be stated here that the nutrition value of mushrooms is small, their chief value being their flavour and the feeling of satiation they produce The following is a list of mushrooms met with in India :—

Agaricus compestris Linn.—The Mushroom; (Sans.—Chattrak; Kash —Manskhel, Beng.-Banger chhata, Sant —Ot : Bomb.—Alombe). Generally in damp debris throughout India during rainy season; universally eaten fresh or dried.

Amito pers. Kurrum.

A. ostreatus Jacq (Cutch & Bomb.—Phanasa-alambe, or vulgarly phansamba) Grows upon stumps of old jack-trees (phanas).

Cantharellus cibarius Fr Kashmir, Peshawar, Mussoorie.

Collybia albuminosa (Berk) Betch. (Syn -Lepiota albuminosa Berk). (Beng —Durga chhata) Bengal, C P , and Berar Grows from inside the termites, nests, eaten with relish.

Coprinus comatus (Battara) Fr The Mushroom; Hindi. & Punj.-Khumbi, Khumb) Punjab, Uttar Pradesh and several other parts of India. Eaten fresh or dried Collected during rainy season.

Entoloma microcarpum Berk & Broome. (Beng -Wee-chhata). Bengal. Grows on the surface of outer crust of termites' nests, commonly eaten by villagers.

Fistulina hepatica Fr. Darjeeling.

Helvella crispa Fr. Common in Afghanistan

Hirneola polytricha Mont. (Syn.-*Exidea polytricha* Mont.). Belgium, Poona, Dharwar, Nidungayam, Malabar and Burma.

Hydnum caralloides Scop Darjeeling 7,500 ft. , Chitral, N.W.F.P. (common) and Afghanistan. In crevices of old tree-trunks collected during August; dried in the sun and largely used.

H. repandum Linn. Mussoorie, Uttar Pradesh

Lactarius deliciosus Fr. Sikkim.

Lentinus subnudus Berk Common in Bengal, Kadala and Bombay. On dead branches of logs Eaten by Kholes fresh and young.

Lepiota mastoidea Fr. Bengal.

L. procera (Scop) Sacc Saharanpur.

Lycoperdon sp. Puff-balls Bengal, Kashmir and many parts of Western Himalayas.

Malanogaster durissiums Cooke Truffle. Simla (abundant), Kangra. Occasionally eaten.

Morchella esculenta Pers. The Morell, (Punj -Guchhian) Plains, kana kach hills. Fleshy fungus abundant in Kashmir, Chamba and many parts of Northern Punjab It appears on hills as snow melts in early spring. It is dried and is eaten with much relish.

Pleurotus cretaceus Massee (Vern -Dhingri). Peshawar and Madhya Pradesh. On wood.

P. fimbriatus Bolt C P. and Berar

Polyporus squamosus (Huds) Fr Darjeeling, 7,500 ft., Pangi, N.W. Himalayas. On dead wood.

Truffles. Stewart describes some being found in Kashmir Badhwar has recently collected some blackish-brown ones from the Kagan valley locally known as 'usri'. They are highly flavoured and their presence in the soil is discovered by the villagers by smell in September-October when they are said to develop the flavour best Goats are also said to dig out some during grazing and eat them. (Also see *Melanogaster durissiums* above).

Volvaria diplasia Berk & Broome (Beng -Pawal-chhatta) Bengal, Burma.

V. terrestria Berk & Broome. (Beng. - Poal-chhattea) Bengal Grows on heaps of waste paddy straw

In addition Stewart mentions another species as being freely eaten in the Punjab, which is known as 'shirian' in the Jhelum and 'batbakri' in the Kair valley It is a thin, flat ragged-looking fungus, yellow above and with white gills below, which is found on dead trees in various parts of the Punjab Himalayas at altitudes of 8,000 to 8,500 ft. He also mentions an 'underground mushroom' of doubtful species found near Multan called 'boinphal'.

So far as the Poisonous Mushrooms are concerned little information is available. **The following is a list of mushrooms which are known to be poisonous:-**

POISONOUS FUNGI

Very little information is available regarding the Indian poisonous fungi From time to time cases of fungus poisoning are reported but, it is to be regretted that little or no attention has been paid to the subject

Stropharia semiglobata (Batsch) Quel from Khasia Hills

Hypholoma fasciculare (Huds). Fr. from Darjeeling and Simla and *Lactarius vellerens* Fr from Sikkim, are regarded as poisonous. There is also evidence on record that there exists in Bengal a fungus which closely resembles an edible form but which contains amanitine or muscarine, the poisonous principle of *Amanita muscaria* by eating which, symptoms closely resembling those of intoxication rapidly ensure. Furthermore, mucor has been regarded as a harmful in India since ages, and the pickles and all edible stuff attacked by it are not thought fit for eating

There are, however, some foreign fungi which are definitely reported to be poisonous

Amanita phalloides The death cap is responsible for perhaps 90 per cent of the deaths caused by fungus poisoning in Europe, England and U S A It is the most dangerous fungus known and very small quantities will cause intense suffering and often death. There are indeed, several other species of the genus that are very poisonous, e g , *Amanita muscaria* -fly agaric and *A. pantheriana* - warted agaric, etc which are intensely poisonous

Lepiota cristata - crested agaric, and several other small species of Lepiota are regarded with suspicion and should be avoided. *Volvaria gloiocephala* - glutinous agaric and its allied mushrooms have always been regarded as poisonous, but there is recent evidence that they may be eaten without ill effects.

Psalliota xanthoderma - yellow staining mushroom has caused illness in some cases.

(d) **Lichens.** Very little is known about these symbiotic organisms which consist of algal cells enveloped by the mycelium of the fungus forming a felted mass Although this group is not to be regarded as a serious menace to livestock, cases of poisoning due to *Parmelia* and *Cretaria* species, etc are mentioned in foreign literature *Parmelia molliuscula* has been said to effect sheep and cattle, producing lack of coordination of the hind limbs In more severe cases the animal lies down and is unable to move either its front or hind limbs. Little or no information is available about lichens in India and even their systematic botany has not been sufficiently worked out.

(e) **Bryophyta** (Liverworts and Mosses). This is the least-known group of plants from the view-point of poisoning and there is little to be said about it.

(f) **Pteridophyta** (Vascular Cryptogams). This group includes ferns and allied plants but unfortunately little or no work has been done in India with regard to their toxicity. Greshoff and others have reported

the presence of hydrocyanic acid in a number of ferns, especially when young. References to the supposed poisonous properties of the bracken fern (*Pteris aquilina*) have appeared in the literature for a long time, and Stockman in great Britain showed that it is poisonous to cattle when eaten in considerable quantities The plant is found in India *Aspidium filix-mas*, the male fern, is suspected of being poisonous. The roots are used in medicine and large quantities of it produce haemorrhagic gastro-enteritis, tremors, weakness, stupor coma, acute nephritis, and cystitis Six drachms of the oleoresin have proved fatal in man and three ounces in the cow. This fern is not found in India, but there are several other foreign species of Aspidium which are also suspected of being poisonous. The present authors have examined Indian representatives of these plants. Some foreign species of Osmunda, Davallia and Adiantum are also suspected of being poisonous and medicinally active. The following ferns growing in the North Western Himalayas have been examined and found to be active as anthelmintics.

Name of Ferns	*Locality*	*Active principles*		
Dryopteris odontoloma	Kashmir & Mussoorie	Up to B P	& U S P	standard
D. barbigera	Kashmir	do	do	do
D. marginata	Kashmir	do	do	do
D. blanfordii	Chamba	do	do	do
D. schimperianum	Mussoorie	do	do	do
D. calcarata	Mussoorie	Not up to standard		
D. marginata	Mussoorie	Up to standard		

Some of the foreign species of *Equisetum* (horsetail) have long been recognized in foreign countries as injurious to cattle and horses. They produce an intoxication in which the animals stagger about and wander aimlessly There is no information available in India with regard to the Indian horsetail *Equisetum arvense*, but several European and American workers are convinced that it is definitely poisonous to horses, while others hold a contrary opinion This plant grows commonly in certain places in India where it might be a menace to livestock.

CHAPTER VIII

II. TOXICOLOGICAL ASPECTS OF PHANEROGAMS (THE FLOWERING PLANTS)

After having given a very brief survey regarding the toxicological aspects of the Cryptogamic flora we will now take up the Phanerogams or the flowering plants Economically this is the most important group both for man and animals from the point of view of everyday necessities of life, e g, food, medicines, etc It is probably on account of this that more information is available with regard to this group.

From a toxicological point of view the Phanerogams may be divided into two main groups.

I PLANTS POISONOUS TO MAN AND LIVESTOCK.

(a) **Medicinal Plants** —Primitive man in the quest for food must have come across plants containing poisonous principles by accident and by experience must soon have learned to avoid them. He even made use of them for the purpose of fighting against his enemies and for procuring his food by killing animals with them. On the whole, our knowledge is fairly well advanced so far as the relationship of poisonous plants have been used for criminal purposes from ancient times but the majority of them are used as medicinal agents for the amelioration of human suffering. It is well known that many plants that are harmful to life in large quantities, produce remarkably beneficial effects in small regulated doses in disease conditions. From the economic point of view, the abundance of this group of plants in our midst is of very great importance in as much as it provides us with medicinal agents of every description, not only sufficient for our own use but also for purposes of export. We have already given brief review of the work done on this group.

(b) **Poisonous to livestock**. The second important aspect of these plants is in connection with other countries, our knowledge is very meagre. In India, there are hundreds of plants that are intimately connected with the food supply of the bovine population such an essential factor in connection with agriculture and food supply. The fodder required for this livestock amounts to about fifty million maunds daily (excluding the concentrates that are in use). Even in its present unsatisfactory condition, the cattle industry contributes very largely to the annual agricultural income of this vast country. Its welfare is therefore of the utmost importance. There is no doubt that the mortality among cattle through poisoning in India is very large. Unfortunately no figures are available of the loss suffered on this account but it must be enormous.

Even in a country like the United States of America where knowledge with regard to Poisonous Plants is well advanced as compared to India, great losses are incurred every year through the poisoning of cattle. The loss occuring in this sub-continent can thus be imagined.

Though the number of plants which are known to have markedly poisonous properties is perhaps small as compared with the total species included in the Indian floras, there are many which are of common occurrence and which no doubt produce serious losses by death or illness among sheep, cattle and other domestic animals The toxic effects produced may be indicated by reduction in the yield of milk, the milk may become unpalatable through excretion in it of toxic products, or it may even become unfit for consumption Some time even the meat of these animals becomes poisonous

It may be stated here that animals do not instinctively select toxic plants as forage, that all classes of livestock are not necessarily equally susceptible to the same poisonous plants, that not all poisonous plants are dangerous from their initial appearance up to maturity and that in some the animals do acquire a depraved appetite for harmful plants, especially when the fodder supply is scarce, a condition which is of frequent occurrence in many parts of India The losses in many cases may be avoided by increasing our knowledge about these plants.

Prevention. The question arises as to what should be done to prevent poisoning by plants. The adage 'prevention is better than cure' is applicable to the problem of plant poisoning with just as much force as in other spheres Often cases are brought to notice when the symptoms have developed and the poison has already circulated in the blood stream and has done irreparable damage to the system Increased knowledge of the poisonous plants is the first step in this direction and this is sure to have an effect in decreasing fatalities among human beings and livestock. It is for this reason that Indian Council of Agricultural Research and Indian Council of Medical Research have encouraged research on this group Keeping the animals always as far as possible from dangerous areas and exercising special care during periods of drought are likely to decrease the mortality amongst livestock Eradication of poisonous plants is a difficult matter, involving an enormous amount of labour and capital, but wherever and whenever possible it should be resorted to This depends upon the habits of the particular plant. Such plants may be annual, biennial or perennial herbs, or shrubs or trees Annuals should be pulled out or dug out before seeding and biennials may be dealt with as the annuals. Perennial are propagated both by the seeds and by the underground organs, such as tubers, rootstocks, bulbs, etc and may be dug out if not deeply rooted Shrubs are woody perennials and should be cut down or dug out Cutting down of lower branches of trees within the reach of animals or children is advocated

The indiscriminate importation of ornamental plants has recently increased the number of poisonous plants in India. Some of these do not find much competition in their adopted home and are likely to spread in this country at an enormously rapid pace. The time is now ripe to agitate for a law prohibiting the importation of poisonous plants for gardens or to take measures to forbid the cultivation of those already introduced. The foodstuff dealers should make sure that adulteration is not practised either with poisonous plants or with plants whose properties are doubtful. Recent work in connection with the causation of epidemic dropsy has shown that in some epidemics, mustard oil adulterated with 'katakar' oil from the seeds of *Argemone mexicana* Linn , the mexican poppy or 'Shialkata', was the cause of the outbreak.

Food Poisons. There is a number of common articles of food which produce poisoning in man and animals and a brief reference may be made to these.

(1) **Khesari dal, Lathyrus sativus** Linn , an important article of diet in man and animals, has been responsible for a large number of cases of poisoning under certain conditions in man, cattle, sheep, pigs, horses, pigions, ducks etc. Examples of lathyrism in man in the form of spastic paralysis are commonly seen every day in the streets of Calcutta and towns in Bihar and its toxic effects in horses and cattle are well known Moderate amounts of this pulse can be taken with impunity, but large amounts, especially to the exclusion of other fodders or foods, produce poisoning.

(2) Grasses (Gramineae) form an important part of the food of animals Some of these develop dangerously large quantities of hydrocyanic acid under certain climatic and soil conditions especially at times of drought or when the plants are wilting, stunted or young Unfortunately our knowledge of Indian grasses in this connection is meagre and it is not possible to estimate the losses in livestock from this source

The common Jowar (*Sorghum vulgare* Pers), the Indian millet, is largely cultivated as fodder for cattle and also for human food It has caused serious outbreaks of poisoning among livestock when wilted or stunted under drought conditions *Sorghum halepense* Pers , a tall perennial grass, with creeping rhizomes and numerous suckers, known as Johnson grass, grows all over India under the name of 'baru' in Hindi and 'Kala-mucha' in Bengali. It has been responsible for serious losses among livestock during recent years in the North-Western parts of India It has been stated that the amount of hydrocyanic acid in these plants decreases with the age of the plant but never entirely disappears The points to be remembered about these grasses are that they are dangerous during wilting and under conditions of draught, that the younger and more succulent ones are often more likely to contain lethal doses of hydrocyanic acid and that if well dried, these plants are generally not dangerous. The toxicity in the case of cyanogenetic compounds depends on the quantities of hydrocyanic acid liberated, and according to the amount and speed at which they are eaten Often such large quantities are given that the animal will die before any veterinary aid can be given. The only remedy is prevention The problem of poisonous grasses is of great economic importance in certain parts of India where rains often fail and drought conditions prevail.

The workers of the Drug Research Laboratory have been engaged in carrying a survey of grasses occurring in the North Western Himalayan Region. About 150 different species have been collected and are now being studied with regard to their nutritive values and possible poisonous properties A number of poisonous grasses have been discovered which the cattle of these parts instinctively avoid, but new-comer gets poisoned *Stipa siberica* commonly growing on hills round Kashmir Valley is an example and there are others.

(3) The linseed plant, ***Linum usitatissimum*** Linn., contains a cyanogenetic glucoside, the maximum amount of which is reached very early in the development of the plant and finally disappears, except in the seed, which

3. **Adonis aestivalis** Linn, *A. chrysocyathus* H. f & T.
These are poisonous to animals and act as poison to heart.

4. **Anemone obtusiloba** D. Don. (Vern - P.-Rattanjog)
It is a vesicant and when taken internally produces vomiting and purging, drying alters properties.

5 **Aquilegia vulgaris** Linn
It is poisonous to animals.

6 **Caltha palustris** Linn.
It is acrid and poisonous and deaths among horses are reported.

7. **Cimicifuga foetida** Linn (Vern - P -Jiunti)
It is a heart depressant and acts as insect repellent.

8. **Clematis gouriana** Roxb, *C graveolens* Lindl, *C napaulensis* DC. (P.-Oandak), *C orientalis* Linn, *C triloba* Heyne (Vern - S.- Laghukarni, H & Bo- Moravela) *C wightiana* Wall.
These are irritant and produce blisters, such properties are altered by drying

9. **Delphinium brunonianum** Royle (Vern - P -Laskar), *D. caeruleum Jacq* (Vern - P.-Dhakangu), *D. elatum* Linn, *D. vestitum* Wall
These are cardiac and respiratory depressants, acrid in taste, insecticidal and poisonous to animals

10. **Nigella sativa** Linn. (S -Krishnajiraka, H & B.-Kalajira, Bo - Kalenjire, M -Karun-shiragam)
Produces abortion in larger doses.

11. **Paeonia emodi** Wall Vern.- H.-Udsalap, P - Mamekh).
It is said to have narcotic properties

12. **Ranunculus arvensis** Linn (Vern - P - Chambul), *R. falcatus* Linn, *R. laetus* Wall, *R lingua* Linn, *R pensylvanicus* Linn. f, *R. sceleratus* Linn (Vern - Pers.- Kabiraj).
These are vesicant and poisonous to livestock when fresh, drying alters these properties.

Magnoliaceae

(Magnolia and Champa Family)

Shikimin, illicin, essential oils.

13. **Illicium griffithii** Hk. f & T., *I anisatum* Linn., (-*I religiosum* Sieb. & Zucc.) (Vern.- H -Anasphal, Bo.-Badian, M.-Anashuppu)
This is the star anise of China (*I verum* Hook.f.) which was imported into India sometimes adulterated with *I religiosum*, it has produced deaths. The latter is respiratory and cardiac poison. Indian *I. griffithii* is also referred to as being poisonous

Annonaceae

(Custard apple Family)

Resin, alkaloid, etc.

14. **Annona reticulata** Linn (Vern - H.-Lona, B -Nona, Bo.-Ramphal, M -Ramsita), *A squamosa* Linn (Vern - S.- Gandhagatra, H - Sitaphal, B -Ata, M - Sitapalam).

The seeds are intensely irritant to the conjunctiva; applied locally they act as abortifacient They have insecticidal properties. Roots act as drastic purgative.

Menispermaceae

(Moonseed Family)

15. **Anamirta cocculus** (Linn) W. & A (Vern - S -Kakaphala, H. & B - Kakmari, M -Kakkay-kolli-virai)

It is a convulsant poison to animals. It acts as an insecticide and it is also used to poison fish and cattle.

16 **Pachygone ovata** (Poir) Miers

It is an insecticide and piscicide

Berberidaceae

(Berberry Family)

Berberine, podophyllum resin

17 **Berberis aristata** DC (Vern -S -Daru haridra, H -Dar-hald (and probably few more species)

It is poisonous to lower animals and is a fish poison

18 **Podophyllum hexandrum** Royle (*P emodi* Wall. ex Hk f et T)

It contains a resin which is a drastic purgative and is irritant to the mucous membranes

Papaveraceae

(Poppy Family)

Morphine, codeine, papaverine, berberine, argemone oil, etc

19 **Argemone mexicana** Linn (Vern - S -Srigala-kantaka, H & B - Sialkanta, M -Birama-dandu)

The oil expressed from its seeds is occasionally mixed with mustard oil which has been held responsible for producing symptoms resembling epidemic dropsy

20 **Meconopsis aculeata** Royle (Vern - Simla - Kanta), *M. napaulensis* DC.

The roots are considerd to have narcotic properties.

21. **Papaver dubium** Linn., *P. nudicaule* Linn , *P. rhoeas* Linn. (Vern - S -Rakra-posta, H -Lalpost, Bo.-Janglimudrika, M.- Shivappu-postaka chedi), *P. somniferum* Linn (Vern.- S.-Ahiphena, H. & B.-Afim, Bo -Aphu, M.-Postakatol)

All species yield opium more or less but *P. somniferum* is the chief source Opium has been used for suicidal purposes

Cruciferae
(Mustard Family)

Glucocides on contact with water produce vesicant active essential oils

22 **Brassica cernua** (Thunb) Forbes et Hemsl , *B integrifolia* (West) O E Schulz, *B juncea* (Linn) (Czernjaew et cosson (rai) , *B napus* Linn with four varieties (Toria, sarson), *B nigra* (Linn.) Koch (black mustard).

Seeds of these are vesicant, and mustard cakes if fed in large quantities and over prolonged periods is harmful to cattle Sarson cake is safest, mixture with rai or black or white mustard dangerous

23 **Lepidium draba** Linn (Vern - Afgh -Bijindak)

It is a fish poison

24 **Sinapis alba** Linn (white mustard)

It is discussed under Brassica

Capparidaceae
(Caper Family)

Essential Oils

25 **Capparis decidua** Edg (*C aphylla* Roth) (Vern - S -Karira, H -Karer, P Karia, Bo -Kari, M Karyal)

It acts as a vesicant

26 **Cleome felina** Linn f *C viscosa* Linn , (Vern -S -Swarnakshira)

It acts as a vesicant

27 **Gynandropsis gynandra** (Linn) Merr (*G pentaphylla* DC)

It is an insecticide and a piscicide It has vesicant properties

Bixaceae
(Chaulmoogra family)

Cyanogenetic glucoside, chaulmoogra oil.

28 **Gynocardia odorata** R Br (Vern -H., B. & Bo -Chaulmoogra)

The fruit acts as a piscicide.

29 **Hydnocarpus kurzii** (King) Warb. (-*Taraktogenos kurzii* King), *H. laurifolia* (Dennst.) Sleumer (-*H. wightiana* Bl)

The fruit acts as a piscicide and the seed oil is gastro-intestinal irritant.

Polygalaceae
(Milkwort Family)

Saponins.

30. **Polygala chinensis** Linn. Vern -H -Meradu, Bo -Negli), *P. crotalarioides* Buch -Ham (Vern -Santh -Lil kathi), *P telephioides* Willd.

It has an acrid taste and is an emetic It has expectorant properties.

Caryophyllaceae
(Carnation Family)

Saponins.

31. **Saponaria vaccaria** Linn (Vern - H.-Musna, B.-Sabuni) and probably some others of the family.

It is acrid and its toxicity is partially removed by boiling

Hypericaceae
(St John's wort Family)

Balsamic resinous juice

32 **Hypericum perforatum** Linn (Vern -H & P -Basant)

It is poisonous to animals, especially horses if taken in excess, usually it is not eaten

Guttiferae
(Gamboge Family)

Gum resins

33 **Calophyllum inophyllum** Linn (Vern -S -Punnaga, H. Sultana, champa, B -Punnag, Bo -Undi, M -Punnagam).

It is a fish poison.

34 **Garcinia morella** Desrouss, and probably others

It yields a gum resin which is a violent gastro-intestinal irritant

Ternstroemiaceae
(Tea Family)

Caffeine, theophylline

35 **Thea sinensis** Linn

Its excessive indulgence only is harmful.

Malvaceae
(Cotton family)

Gossypol, resin, ephedrine, pseudo-ephedrine.

36. **Gossypium** species.

The root bark is emmenagogue and used as abortifacient; occasionally harmful effects of cotton seed cakes on animals have been reported.

37. **Malva parviflora** Linn. (Vern -H. Panirak)

It is reported to have produced narcotic poisoning in animals.

38. **Sida rhombifolia** Linn (Vern - S -Atibala, H & B -Swet-berela, M -Athiballachetu)

The ripe capsules are reported to be fatal to fowls.

Linaceae
(Flax Family)

Cyanogenetic compounds, cocaine

39. **Erythoroxylum coca** Lam

It is a central nervous stimulant, sensory nerve endings-paralysant, addiction to it is harmful

40 **Linum usitatissimum** Linn (Vern - S -Atasi, H & B -Tisi, Bo -Alasi, M -Alshiviral).

The young plants are known to produce deaths in animals, sometimes seed cakes also harmful

Zygophyllaceae

(Bean-caper and Guaicum Family)

Harmine, harmaline, harmalol, pegamne, essential oils, saponins, resins.

41 **Peganum harmala** Linn. (Vern.-H & Bo -Hurmal, B -Isband, M -Shimai-azha-vanai-virai)

It is an insecticide, narcotic, nauseant and emetic It is used as abortifacient It is a protoplasmic poison and paralyses skeletal and cardiac muscles of frog

42. **Tribulus terrestris** Linn. (Vern -S -Gokshura, H -Chotagokhru, B -Gokhuri, Bo -Lahana-gokhru, M.-Nirunji)

It causes the disease goeldikkop (dikgeel) in South Africa in small stock which is characterized by oedema of head, fever and jaundice.

Rutaceae

(Rue Family)

Essential oils, rutin, skimmianine, saponins, resins, etc.

43. **Acronychia pedunculata** (Linn) Miq (*-A laurifolia Bl*)
It is a fish poison.

44. **Ruta graveolens** Linn var *angustifolia* Hk f., (Vern - S.-Somalata, H.-Sadab, B.-Ermul, B -Satap, M.-Arvada), *R. tuberculata* Forsk.

These are acro-narcotic poisons which are rubefacient. The oil and herb frequently used to produce criminal abortion.

45 **Skimmia laureola** Sieb & Zucc ex-Walp (Vern - Nep -Chumlani, P -Ner).

It is reported to be poisonous to sheep and goats.

46. **Zanthoxylum alatum** Roxb (Vern - S -Tumburu, H.-Tejmal, B.-Nepali dhania) (Probably some more species)

It is a fish poison.

Simaroubaceae

(Bitter-bark Family)

Essential oils, saponins, resins, bitter substances

47 **Ailanthus altissima** (Mill) Swingle (—*A glandulosa* Desf)

It is nauseant and nervous system depressant Accumulation of its leaves in well water is reported to produce chronic gastritis

48. **Balanites aegyptiaca** (Linn) Delile (—*B roxburghii* Planch) (Vern -S -Ingudi, H & B -Hingan, Bo -Hinger, M.-Najunda)

It is believed to be a fish poison and a purgative

49 **Brucea amarissima** (Lour) Merr - (*B sumatrana* Roxb)

Its seeds produce nausea, vomiting, abdominal pain and purging

50 **Picrasma napalensis** Benn

It is stated to be used as larvicide in Sikkim

Meliaceae

(Neem and mahogany Family)

Bitter substances, bitter oil, saponins

51. **Azadirachta indica** A Juss

It is parasiticidal and the leaves are used as insect repellent

52. **Melia azedarach** Linn

Its berries are especially poisonous to man and animals, they are narcotic and gastro-intestinal irritant

53 **Walsura piscidia** Roxb (Bo & M -Walsura).

It is a dangerous emmenagogue and a violent emetic. It is largely used as a fish poison.

Celastraceae

(Spindle-tree Family)

Alkaloid, essential oil, resin.

54. **Elaeodendron glaucum** Pers. (Vern -H.-Bakra, Bo.-Bhuta-pala, M -Selupa.)

It is emetic, overdoses fatal.

Sapindaceae

(Soap-nut Family)

Saponins, cyanogenetic compounds

55 **Cardiospermum halicacabum** Linn (Vern -S -Karnaspota, H.-Kanaphata, M -Mooda cotton).

Its leaves are emetic and rubefacient

56 **Dodonaea viscosa** Linn (Vern -H -Aliar, Bo -Bandurgi, M -Virali)

It is fish poison, it is deleterious to camels

57 **Harpullia cupanioides** Roxb.

It is a fish poison

58 **Melianthus major** Linn.

It produces acute diarrhoea, salivation and colic, honey from flowers stated to be poisonous.

59 **Sapindus mukorossi** Gaertn. (Vern -S -Phenila, H B & Bo -Ritha), *S trifoliatus* Linn (Vern -S -Phenila, H B. & Bo -Ritha, M -Ponnan-kottai)

Both are fish poisons, emetic, purgative and are used for procuring abortion

60 **Schleichera oleosa** (Lour) Merr. (*S trijuga* Willd.) (Vern -H - Kosum, M -Pu-maram).

The oil is occasionally mixed with mustard oil or ghee It produces irritant poisoning and the seeds are used as insecticide.

Anacardiaceae

(Cashew and mango Family)

Toxic phenolic compounds, toxic resin.

61 **Anacardium occidentale** Linn. (Vern -H. & Bo.-Kaju, B.-Hijli badam, M -Mundiri-kai).

The pericarp contains powerfully vesicant juice, used to preserve floors, wood, books, etc. from white ants, tar from bark also vesicant.

62. **Holigarna arnotiana** Hook. f. (Vern -Bo -Bibu), *H. ferruginea* March, *H grahamii* (Wight) Hook f , *H longifolia* Buch. Ham ex-Roxb. (Vern- B.-Barola, Bo -Hulugiri).

The juice is vesicant although not equally powerful in all species.

63. **Rhus insignis** Hook f., *R. punjabensis* J. L. Stewart, *R. succedanea* (Vern -S -Karkata sringi, H & B.-Kakrasingi, Bo -Takadasingi), *R. wallichii* Hook. f. (Vern -Nep.-Ghosi, H -Akoria.)

Dreaded by local people; even smoke from burning wood is considered poisonous, its juice is vesicant

64 **Semecarpus anacardium** Linn f (Vern -S -Bhallatamu, H. & B -Bhela, Bo -Biba, M -Shayrang), *S travancoricus* Bedd

The pericarp contains vesicant juice It is used in some parts as abortifacient.

Coriariaceae

(Coriaria Family)

Coriamyrtin, tutin in foreign species.

65. **Coriaria nepalensis** Wall

It is stated to be narcotic, the foreign species are very poisonous acting like picrotoxin and producing convulsions.

Moringaceae

(Horse-radish Family)

Essential oils, alkaloid, moringine, moringinine

66 **Moringa oleifera** Lamk (—*M pterygosperma* Gaertn) (Vern -S - Sobhanjana, H -Sajnah, B -Sojna, Bo-Sujna, M -Murungai)

The fresh root bark is said to be vesicant and is used to procure abortion Moringinine acts on sympathetic nervou, system.

Leguminosae

(Pea Family)

Alkaloids, glucosides, saponins, cyanogenetic compounds, rotenone, toxic albumin, bitter substances ; globulins

67. **Abrus precatorius** Linn (Vern -S & Bo -Gunja H -Gaungchi B.-Kunch, M -Gundumani)

It is specially a blood poison and is used to poison cattle and to procure abortion.

68 **Acacia pennata** Willd (H.-Biswul, Kumaon -Agla, Nep -Arfu)
It is a fish poison

69 **Albizzia procera** Benth (Vern -H -Safed siris, B -Kori, Bo - Kinai tihiri, M -Konda vaghe)
It is a fish poison

70 **Butea monosperma** (Lam) O Ktze (—*B frondosa* Koen ex-Roxb) (Vern - S -Kinsuk, H & B -Palas)

Its seeds are insecticide and painful if taken internally

71 **Caesalpinia nuga** Ait (Vern -M -Kakumullu)
It is a fish poison.

72. **Canavalia virosa** W. & A. (*C. ensiformis DC.* var *virosa* Baker. (Vern .-M -Kattuvalari).

Its fruit is stated to be poisonous.

73 **Cassia absus** Linn. (Vern -H -Chaksu, M -Karun Kanam), *C acutifolia* Delile. *C alata* Linn , *C. angustifolia* Vahl, *C. fistula* Linn , *C obovata* Collad (Vern —Surati sonnamukai).

These are all purgatives which are irritant in large doses *C absus* seeds are irritant application to eyes, and *C alata* is a fish poison

74 **Clitoria ternatea** Linn (Vern -S -Aparajita, H. & B -Aparajit, M -Kakkanan)

The roots are powerful cathartic like Jalap, not a safe medicine*

75 **Cytisus scoparius** Linn

The plant is not eaten by cattle It is an emetic and a cathartic

76 **Dalbergia stipulacea** Roxb.

It is a fish poison.

77 **Derris elliptica** Benth (Vern -Malay -Tubah), *D. scandens* Benth (Vern -B -Noalata, P -Gunj. M -Nala tige), *D uliginosa* Benth. (Vern -B -Panlata, Bo -Kirtana), (possibly *D ferruginea* Benth)

These are all fish poisons and *D elliptica* is a powerful insecticide.

78. **Entada phaseoloides** (Linn) Merr (—*E. scandens* Benth) (Vern -H -Chian, B -Gilagach, Bo -Gardal).

It is a fish poison

79 **Lathyrus aphaca** Linn , *L sativus* Linn (Vern -S -Triputi, H. & B -Khesari, Bo -Lakh)

It is a food and fodder *L sativus* if taken in large amounts and over prolonged period produces lathyrism in man and animals Ripe seeds of *L aphaca* are stated to be narcotic if taken in excess

80 **Melilotus alba** Desr.

It is stated to be poisonous to cattle.

81 **Milletia auriculata** Baker, *M pachycarpa* Benth., *M. piscidia* Wight.

These are fish poisons *M. auriculata* is an insecticide.

82 **Mundulea suberosa** Benth.

It is a fish poison.

83 **Ougenia dalbergioides** Benth. (Vern - S.-Tinisasegandun, H.-Sandan, B.-Tinis, Bo Tiwas, M-Tella-motuku).

It is a fish poison.

84. **Phaseolus lunatus** Linn.

The coloured variety sometimes exhibits poisonous properties if eaten.

85. **Pithecellobium bigeminum** Mart (Vern -H. & Bo -Kachlora)

It is a fish poison The seeds are stated to be eaten in Burma but sometimes produce severe poisoning

86 **Pongamia pinnata** (Linn) Merr (—*P glabra* Vent) (Vern - S., H. & Bo -Karanja, B Dahar karanja, M -Pungammaram)

It is piscicide and insecticide.

87 **Sophora mollis** R. grah var. *Hydaspidis* Baker, *S tomentosa* Linn.

The Seeds of *S. mollis* have insecticidal properties and the leaves of *S. tomentosa* are powerfully emetic and cathartic in large doses.

88 **Tephrosia candida** Linn , *T. purpurea* Pers (Vern - S -Sarapunkha, B -Bon-nil, H & Bo -Sarphankha, M -Kolluk-kay-velai)

These are fish poisons Some foreign species are insecticides Some species of Tephrosia in India are likely to prove of value as insecticides

89. **Trifolium repens** Linn

It is highly prized fodder in Europe In the Himalayas poisoning has been reported in horses

90 **Vicia sativa** Linn. (Vern -H -Ankra, B.-Ankari)

It is suspected to be the cause of lathyrism.

Rosaceae

(Rose family)

Cyanogenetic glucosides, phloridzin

91 **Prunus amygdalus** Batsch. (bitter variety). (Vern -H , B. & Bo - Badam, M -Vadam-Kottai), *P armeniaca* Linn. (Vern -H -Khubani, P -Gurdlu), *P. avium* Linn , *P. cerasus* Linn , *P. mahaleb* Linn (Vern .-S , Priyangu), *P padus* Linn. (Vern -H -Jamana, P -Jamma), *P. persica* Stokes, (Vern -H -Aru), *P. puddum* Roxb , (Vern -S.-Padmaka, H -Paddam, Bo -Padma-kasta), *P. undulata* Buch -Ham

The seeds are poisonous and the leaves of many species are said to be dangerous to live-stock when wilted; harmless when on the plant, suspicious when dried.

92. **Pygeum gardneri** Hook. f.

The seeds are fish poison.

93. **Pyrus aucuparia** Linn., *P. malus* Linn.

The bark of *P. aucuparia* is irritant to the alimentary tract and wilting leaves of other species are occasionally poisonous to animals browsing upon them.

94. **Rubus moluccanus** Gaertn (Vern·-Kumaon.-Katson)

The leaves are reported as powerful emmenagogue and abortifacient.

Crassulaceae
(Life-Plant-Family)

Glucosides-in foreign species.

95 **Kalanchoe spathulata** DC. (Vern:-H.-Tatara).

The expressed juice of bitter variety is a drastic purgative and is poisonous to goats. It is not eaten by cattle. Leaves are said to be insecticidal.

Droseraceae
(Sundew Family),

Organic acids, proteolytic enzymes

96 **Drosera peltata** Sm var. *lunata* Clarke, (Vern - H -Mukajali, P Chitra), *D. spathulata* Labill. (*D. burmanni* Vahl)

These are rubefacient Some Australian species are reported to be injurious to sheep.

Combretaceae
(Myrobolan Family)

Tannins

97 **Terminalia bellerica** Roxb (Vern -S -Bahira, H. & B.-Bahera, Bo -Behaira, M.- Vallaimurdu), *T chebula* Retz. (Vern - S & B - Haritaki, H -Harara, Bo - Hirda, M - Kadukkay-pu)

T bellerica is reported to be fish poison. The kernel is stated to be poisonous and cases are reported where narcotism followed nausea and vomiting Some varieties of *T chebula* are drastic purgatives.

Myrtaceae
(Myrtle and jamun Family)

Saponins, essential oils, tannins.

98 **Barringtonia acutangula** Gaertn (Vern - S. - Dhatriphal, B - Hijal, H -Hijjal, Bo -Samudraphala, M -Samutrapullam), *B asiatica* Kurz (*B speciosa* Forst), *B racemosa* Bl (Vern - S - Samudrapad, H -Norvishee, B -Samudraphal, M -Samudra).

These are believed fish poisons

99 **Careya arborea** Roxb. (Vern -S , H & B.-Kumbhi).

It is a fish poison The inner bark rubbed on shoes keeps off leeches.

100 **Eucalyptus globulus** Labill (Vern - M -Karpura maram)

The essential oil contained is an important ingredient of insecticides, internally gastro-intestinal irritant.

101 **Melaleuca leucadendron** Linn. (Vern·- H., B & Bo.-Nim, M - Vembu)

Its essential oil is an irritant and a mosquito repellent.

Lythraceae

(Henna and pomegranate Family)

Acrid principle

102 **Ammannia baccifera** Linn (Vern - S - Agnigarva, H - Janglimendi, M - Nirumel-neruppu) *A. senegalensis* Lamk (Vern - P.- Fauglimehandi)

These are vesicant , taken internally they cause great pain.

103 **Lagerstroemia indica** Linn , *L speciosa* (Linn) Pers (-*L flosreginae* Retz) (Vern - S - Arjuna, H & B -Jarul, B - Taman, M Kodali)

The bark and leaves are purgative, seeds of the former species are narcotic

Samydaceae

(Casearia Family)

104 **Casearia graveolens** Dalz (Vern - H - Chilli, Bo - Naro), *C. tomentosa* Roxb (Vern - H - Chillara)

The pounded fruit is used as a fish poison

Caricaceae

(Papaw Family)

Carpaine, carposide, caricin in seeds yielding essential oil on hydrolysis, papain

105 **Carica papaya** Linn (Vern - H - papaya, B -Papey, Bo.-Papai, M.- Pappayi)

The seeds are believed to have powerful emmenagogue properties and are used as abortifacient The juice of unripe fruit is acrid or even vesicant

Passifloraceae

(Passion-flower Family)

Hydrocyanic acid, saponins

106. **Adenia (modecca) palmata** Engl., *A wightiana* Engl.

The roots and fruits are poisonous. Deaths from eating fruits of *A palmata* are reported

Cucurbitaceae

(Cucumber Family)

Bitter substances, such as colocynthin, alkaloids, glucosides.

107. **Citrullus colocynthis** Schrad, (Vern - S -Indra varuni, H. & Bo.-Indrayan, B.-Makhal, M -Peyt-tumatti) *C vulgaris* Schrad. (Bitter variety).

The fruit is purgative, *C colocynthis* is a drastic purgative and has produced fatal results, the dust when dry is very irritating to eyes and nostrils.

108. **Corallocarpus epigaeus** Benth. & Hook f.

Its fruit is a drastic purgative

109. **Cucumis sativus** Linn (Bitter variety) (Vern -S -Sukasa, H - Khira, B -Sasa, Bo -Kankri, M -Mulluvellari), *C trigonus* Roxb (Vern -S -Vishala, H -Bislambhi, M -Hattut-tumatti)

The fruit is a purgative, *C trigonus* excessively so

110 **Lagenaria siceraria** Standl (*L vulgaris* Seringe) (Wild variety)

It is drastic purgative Cases have been reported where beer kept in bottle gourd produced poisoning

111 **Luffa acutangula** Roxb. var *amara* C B Clarke (Vern -S - Koshataki, H & Bo -Torai, B -Jhinge, M -Pikumkai), *L aegyptiaca* Mill. ex. Hook f (Vern -S -Rajkoshataki, H -Ghiatarui, B -Dhundul, Bo -Ghosali, M -Guttibira) (Wild variety), *L echinata* Roxb (Vern -S -Koshataki, H -Kukarlata, B -Ghosalata, Bo -Kukarwele, M -Panibira).

The fruit of *L. acutangula* var *amara* is violently emetic and purgative and is not eaten. Others are also purgative

112 **Momordica balsamina** Linn (Vern -Bo -Kurelo-jangro), *M charantia* Linn (Vern -S -Sushavi H -Karela, B -Karala, Bo - Karla, M -Pavakkachedi), *M tuberosa* Cogn (—*M cymbalaria* Fenzl) (Vern -Bo -Kadavanchi)

Fruit of *M balsamina* is fatal to dogs, death occurs from violent vomiting and purging produced by the juice of this plant. *M charantia,* roots are used as abortifacient Decoction of roots of *M. tuberosa* are used as abortifacient

113. **Trichosanthes bracteata** Voigt (—*T palmata* Roxb) (Vern -S - Mahakal, H -Lal-indrayan, B.-Makal, Bo -Kaundal, M -Korattai) *T. cucumerina* Linn. (H -Jangli-chichonda, S -Patola, B -Bonpatol, Bo -Ranparul, M.-Pudel), *T dioica* Roxb (Vern -S - Patola, H.-Parvar, B.-Potal, Bo -Potala, M -Kombupudalai)

The roots are powerful cathartic Fruit of *T cucumerina* is never eaten, because of powerful cathartic action Fruit of *T. bracteata* is used as cattle poison and to destroy crows

114 **Zanonia indica** Linn. (Vern -S.-Dirghapattra, H -Chirpoti, Bo.- Chiraputi, M.-Penarvalli).

The fruit is very acrid and a powerful cathartic

123. **Sambucus ebulus** Linn , (Vern -P —Mushkiara), *S. nigra* Linn

Both are strongly purgative *S ebulus* has foetid smell when bruised and is not eaten by cattle, poisoning amongst boys and fowls reported

Rubiaceae

(Madder and coffee Family)

Quinine, quinidine, cinchonine, cinchonidine, caffeine, emetine, cephaeline, ipecacuanhin, essential oils, saponins.

124 **Adina cordifolia** Benth & Hook f (Vern —S.-Dharakadamba, H -Hardu, B -Keli kadam, M -Manja kadambe)

Its juice is used as insecticide

125 **Cinchona calisaya** Wedd and var. *ledgeriana* Howard, *C officinalis* Linn f , *C succirubra* Pavon

The cinchona alkaloids are general protoplasmic poisons and parasiticide The plants are believed fish poisons.

126 **Coffea arabica** Linn (Vern —H -Coffee, B.-Kafi)

Its excessive indulgence produces harmful effects and chronic poisoning

127 **Cephaelis ipecacuanha** Stokes

It is emetic and irritant and a powerful cardiac depressant

128. **Randia dumetorun** Lamk , (Vern —S -Madan, H -Mainphal, B -Menphal, Bo -Gelaphal, M -Maruk-kallan-kai), *R uliginosa* DC (Vern —S -Pindaluka, H -Pindalu, B -Piralu, Bo -Pendari, M - Wagata)

These are believed fish poisons *R dumetorum* is used to preserve grain from attacks of insects, it is also used as abortifacient.

Compositae

(Sun-flower Family)

Essential oils, artemisin, santonin, bitter substances (absinthin lactucin, etc), saponins, resin, senecio alkaloids, xanthostrumarin, pyrethrins.

129. **Anthemis cotula** Linn.

It is an undesirable food for livestock, it is acrid and vesicant.

130. **Artemisia absinthium** Linn. (Vern —H. & Dec -Vilayati afsantin), *A maritima* Linn (Vern —S -Gadadhar, H -Kirmala, Bo - Kiramani owa), *A. vulgaris* Linn (S -Nagadamani, H -Nagadouna, B -Nagdona).

The essential oil from *A absinthium* is a violent narcotic poison producing convulsions *A maritima* is an irritant poison when given in large doses, and fatal cases are reported *A vulgaris* produces epileptiform spasms in man and is also reported as fish poison.

131. **Centratherum anthelminticum** O. Ktze.(-*Vernonia anthelmintica* Willd).

It is used as insecticide and insect repellent.

132. **Chrysanthemum cinerariæfolium** Vis., *C. coccineum* Willd., *C. roseum* Adam.

All are reputed insecticides

133. **Erigeron canadensis** Linn.

It is an irritant.

134 **Eupatorium odoratum** Linn.

It is stated to be a fish poison. *E urticifolium* L. f. of foreign countries produces acidosis and trembles in sheep and cattle

135. **Gnaphalium luteo-album** Linn (Vern –P -Balraksha).

It is suspected to produce livestock-poisoning in South Africa.

136. **Inula graveolens** Desf.
It is suspected to be poisonous to livestock.

137. **Lactuca tatarica** C A Meyer var *tibetica* C B Clarke

It is occasionally browsed by sheep, sometimes injurious

138. **Saussurea lappa** C.B Clarke (Vern —S.-Kushtha, H -Kut, B.-Pachak, Bo.-Ouplate, M.-Goshtam).

The roots are used to protect woollen fabrics against insects.

139. **Senecio** *species* (*S vulgaris* Linn introduced plant)

The Indian species should be studied in Ragwort poisoning due to several species of this plant is well known in foreign countries, some species produce hepatic cirrhosis

140. **Sphaeranthus indicus** Linn (Vern —S.-Munditika, H & Bo -Gorakmundi, B.-Murmuria, M -Kottak).

It is believed to be a fish poison.

141. **Xanthium strumarium** Linn. (Vern —S.-Arishta, H.-Chhota-gokru, B -Bon-okra, Bo.-Shankesh vara, M -Marlu-mutta)

It is reported to be poisonous to cattle and pigs in America and Australia.

Campanulaceae
(Bell-flower Family)

Alkaloids.

142. **Lobelia excelsa** Leschen, *L. nicotianifolia* Heyne. (Vern—Bo.-Dhavala, M.-Rattu papillay).

It is irritant to nose and deaths have been reported in man. Its action resembles nicotine, except that more burning pain in the stomach is produced. It is used as substitute for datura.

Ericaceae

(Rhododendron Family)

Andromedotoxin, ericolin, Essential oils

143. **Gaultheria fragrantissima** Wall.

It is an irritant poison and deaths are reported from its use as abortifacient

144 **Pieris ovalifolia** D. Don.

It is poisonous to goats and is an insecticide.

145 **Rhododendron anthopogon** D Don, (Vern —Kash.-Tazak-tsun), *R arboreum* Sm (Vern -P —Ardawal), *R. barbatum* Wall (Vern — Nep -Guras), *R campanulatum* D Don (Vern -H -Cheraelu Kash -Gaggar), *R cinnabarinum* Hook f (Vern.--Nep -Bulu), *R falconeri* Hook f (Vern —Nep -Kurlinga), *R. setosum* D. Don (Vern - Bhutia -Tsallu).

These are probably all poisonous to live-stock; some are reported to be fish poisons and honey from some is reported to be poisonous.

Plumbaginaceae

(Plumbago Family)

Plumbagin

146 **Plumbago indica** Linn (-*P. zeylanica* Linn) (Vern:-S —Chitraka H & B -Chita, Bo -Chitaro, M -Chittira), *P rosea* Linn. (Vern — S -Chitraka, H., B. & Bo -Lal chitra, M.-Chittur-mol).

These are strong irritants externally and internally and are used to procure abortion.

Primulaceae

(Prime-rose Family)

Saponins

147. **Anagallis arvensis** Linn. (Vern —H.-Jonkhmari)

It produces gastro-enteritis in dogs and horses. It is used to poison fish and expel leeches from nostrils of animals.

148 **Cyclamen persicum** Miller (Vern --Ind. Baz.-Bankhur-i-Miryam).

It is believed to be a fish poison.

149. **Primula reticulata** Wall. (Vern -Kumaon.—Bishcopra).

It is stated to be poisonous to cattle.

Myrsinaceae

(Ardisia Family)

Saponins.

150 **Maesa indica** Wall. (Vern —M -Kirithi) Leaves are stated to be fish poison.

Sapotaceae

(Sapodilla and mohwa Family)

Saponins

151 **Madhuca indica** J F Gmel *M* (*Bassia*) *latifolia* (Roxb.) Macbride, *M. longifolia* (Linn) Macbride.

The residual cake is used as fish poison and is said to have insecticidal properties *Mohwa meal* is used to kill worms on lawns

Ebenaceae

(Ebony Family)

Bitter substances

152 **Diospyros ebenum** Koenig (Vern – H & Bo -Tendu, M -Acha), *D. montana* Roxb (Vern -S --Tumala, H -Lohari, B -Ban-gal, Bo Kundu, M -Muchi-tanki), *D paniculata* Dalz (Vern —S - Thinduka. M -Karinthuvari)

All these are believed to be fish poisons.

Salvadoraceae

(Salvadora Family)

153 **Salvadora oleoides** Dcne (Vern —H , S. & B -Pilu, Bo.- Kankhina, M -Ughaiputtai), *S persica* Linn (Vern —S -Pilu, H & B -Chota-pilu, Bo -Pilvu, M -Ughaiputtai)

The root bark is vesicant

Apocynaceae

(Dog-bane and Oleander Family)

Kurchi and rauwolfia alkaloids, glucosides, e g cerberin, karabin, neriin, neriodorin, oleandrin, I-strophanthin, thevetin, etc., bitter substances

154 **Allamanda cathartica** Linn. (Vern —Bo -Jahari sontakka) It is a hydragogue cathartic

155. **Cerbera manghas** Linn (-*C odollam* Gaertn) (Vern.—B.-Dhakur, M -Kataralı)

The green fruit is used to poison dogs. The seeds are irritant poison and the plant is a fish poison

156 **Ervatamia dichotoma** (Roxb) Blatter (-*Tabernaemontana dichotoma* Roxb)

The seeds are powerfully narcotic and poisonous.

157 **Holarrhena antidysenterica** Wall (Vern – S -Kutaja, H Karchi, B -Kurchi, Bo -Pandhrakura, M -Kashappu-vetpalarishi)

It is not browsed by cattle and goats, it is an anthelmintic, kurchicine is a general protoplasmic poison.

158. **Lochnera pusilla** K Schum (-*Vinca pusilla* Murr.), *L rosea* (Linn) Reichb (-*Vinca rosea* Linn)

These are cardiac poisons and *L pusilla* is regarded as poisonous to cattle.

159 **Melodinus monogynous** Roxb (Vern —B -Sadul kou)
It is a fish poison

160 **Nerium-indicum** Mill. (*N odorum* Soland) (Vern —S -Karavi, H -Karber, B -Karabi, Bo -Kanhera, M Alari)

It is very poisonous and is used for suicidal purposes and to procure abortion, depresses nervous system and heart

161 **Plumeria acuminata** Ait (-*P acutifolia* Poir) (Vern —S -Kshira champa, H & Bo -Khair Champa, B -Gobar champa, M -Vadaganneru)

Its milk is rubefacient and is used to procure abortion, internally it acts as purgative and is poisonous

162 **Rauwolfia serpentina** Benth ex Kurz (Vern – S -Sarpagandha, H -Chota chand, B & Bo -Chandra, M -Covannamilpori)

It is hypnotic and a fish poison

163 **Thevetia peruviana** (Pers) Merr (-*T neriifolia* Juss) (Vern —H & Bo-Pila-kaner, B -Kolkaphul, M -Pachch-ai-alari)

All parts especially seeds are very poisonous It is used to poison cattle and produces violent vomitting and purging Action on heart like digitalis It is also a fish poison

Asclepiadaceae

(Milk-weed Family)

Tylopharine, glucosides, bitter substances, resins, saponins, etc

164 **Asclepias curassavica** Linn (Vern —H -Kakatundi, Bo-Karki)

It is a fish poison, emetic and cathartic

165 **Calotropis gigantea** R Br (Vern —S -Arka, H -Ak , B & Bo - Akanda, M -Erukku), *C procera* R Br (Vern - S Alarka, H - Madar, P -Shakar-al-lighal, Bo -Mandara, M -Vellerku)

Milk of these plants is drastic purgative and caustic Stated to be used for suicidal and homicidal purposes and as an abortifacient and cattle poison

166 **Cryptostegia grandiflora** R Br (Vern —Bo -Vilayati-vakhandi, M.-Palai).

A fatal case from leaves is reported in which persistent vomiting was observed

167. **Cynanchum arnottianum** Wight , *C. vincetoxicum* Pers.

C. arnottianum is used as insecticide. *C. vincetoxicum* is not eaten by cattle and is regarded poisonous Its root is emetic.

168 **Sarcostemma acidum** (Roxb.) Voigt (-*S. brevistigma* W. & A.) (Vern —S & Bo -Soma, H. & B -Somlata, M.-Kondapala).

Stated to have insecticidal properties.

169 **Secamone emetica** R. Br. (Vern —B -Shada-buri).

The roots are acrid and the plant is powerfully emetic.

170 **Tylophora indica** (Burm f) Merr (-T *asthmatica* Wight and Arn), (Vern -H. & B -Antamul, Bo -Anthamul, M.-Nay-palai), *T. fasiculata* Buch.-Ham (Vern -Bo -Bhuidari)

Fatal cases are reported in man, it is emetic and *T. fasciculata* is used as rat poison.

Loganiaceae

(Nux-vomica Family)

Strychnine, brucine, etc.

171 **Strychnos colubrina** Linn (Vern —H & B -Kuchila-lata, Bo - Goagarilakei, M -Nagamusadi), *S nuxvomica* Linn. (Vern —S - Visha-mushti, H -Kuchla, B -Kuchila, Bo.-Kajra, M -Yetti)

These are poisonous *S nux-vomica* seeds are used as fish poison and are source of strychnine, one of the deadliest poisons known Suicidal and homicidal cases are recorded. It is employed to kill dogs, rodent, etc

Boraginaceae

(Borage and Sebestan Family)

Alkaloids.

172 **Heliotropium eichwaldii** Steud (Vern —H & P -Nilkattei, Kash.- Chirghas), *H indicum* Linn (Vern —S -Hastisunda, H. & B - Hatisura, Bo -Burundi, M -Tel-kodukki)

These are suspected to be poisonous

Convolvulaceae

(Convolvulin, pharbitin, terpithin, terpethein, cucutalin, resin.

173 **Calonyction muricatum** (Linn.) G Don (-*Ipomoea muricata* Jacq)

See Ipomoea.

174 **Convolvulus arvensis** Linn (Vern —H -Hiranpadi, Bo -Hiran-pag, M -Naranji), *C scammonia* Linn.

The roots are strongly purgative

175. **Cuscuta reflexa** Roxb. (Vern —S Amaravela, H.-Akasbel, B - Algusi, Bo.-Nirmuli, M -Sitamapurgonalu).

It is nauseant and emetic, it is used to procure abortion.

176 **Ipomoea reptans** (Linn) Poir (-*I aquatica* Forsk) (Vern — S -Kalambi, B -Kalmisak, Bo.-Nalichi baji, M -Sarkarei-valli), *I. nil* Roth (—*I. hederacea* Jacq.) (Vern —H., B. & Bo - Kaladana, M -Jirkivirai), *I purga* Heyne,

These are strongly purgative and irritant poisons in over-doses.

177. **Operculina turpethum** (Linn) Manso (—*Ipomoea turpethum* R. Br.)

See Ipomoea

Solanaceae—

(Datura and nightshade Family)

Hyoscyamine, hyoscine, atropine

178 **Atropa belladonna** Linn. (Vern —H -Sag-angur, B -Yebruj, Bo.-Girbuti)

Fatal cases of poisoning are reported, dryness of mouth and throat, dilation of pupils and delirium characteristic features

179 **Capsicum annuum** Linn. (Vern —H. & P -Mirch), *C frutescens* Linn., *C. minimum* Roxb.

The seeds are gastro-intestinal irritant and are used for torturing purposes

180. **Datura fastuosa** Linn. (Vern —S -Krishna dhatura, H & B - Kala Dhatura, M -Karu umattai), *D metel* Linn , *D. stramonium* Linn (Vern —B.-Sada dhutura, P -Tattu dattura, M -Umatai).

These are commonly used by criminals for stupefying their victims , symptoms resemble those of Atropa

181. **Hyoscyamus muticus** Linn , *H. niger* Linn (Vern —S -Parasi-kaya, H -Khurasani ajvayan, B.-Khorasani ajowan, Bo -Khora-sani-owa, M -Khorasani-yomam), *H. pusillus* Linn , *H. reticulatus* Linn.

Cases of livestock and children poisoning are on record, action like Atropa.

182 **Lycium barbarum** Linn. (Vern —Baluchi -Koh-tor)

It is reported to be poisonous to livestock

183 **Mandragora caulescens** Clarke

It is suspected to be poisonous

184 **Nicandra physaloides** Gærtn.

It is considered to be insecticide

185 **Nicotiana rustica** Linn. (Vern —H & B -Vilayeti tamaku, P - Kakkar tamaku), *N. tabacum* Linn (Vern —H -Tamaku, B - Tamak., Bo -Tambaku, M.-Pugai-ilai)

These are insecticide and are also used to ward off leeches fatal cases reported among human beings and livestock.

186. **Physochlaina praealta** Miers (Vern —P -Nandru)

It is reported to be poisonous.

187. **Scopolia anomala** (Linn et Otto) Airy-Shaw. (*S. lurida* Dunal).

It is poisonous and action is like Atropa.

188 **Solanum dulcamara** Linn (Vern —S Kakmachi, P -Ruba-barik) *S. incanum* Linn, (-*S coagulans* Forsk), *S. nigrum* Linn (unripe berries) (Vern —S & B -Kakmachi, H -Makoi, Bo -Mako, M -Manattak kali), *S spirale* Roxb (Vern —H -Mungas kajur, Bagua), *S. tuberosum* Linn (Sprouting).

The cases of poisoning among human beings and animals are reported, some fatal These are gastro-intestinal irritant, occasionally associated with atropa-like symptoms

189 **Withania somnifera** Dunal (Vern —S, B & Bo -Ashwagandha, H -Asgandh, M -Amku-lang-kalang)

It is reported to be used as abortifacient and as an insecticide, it is also stated to be hypnotic

Scrophulariaceae
(Mimulus and Digitalis Family)

Digitalin, digitonin, digitoxin, gitalin, gitonin, etc, saponin, bitter substance

190 **Digitalis purpurea** Linn

It is a cardiac poison and fatal cases due to eating of plant are reported in India

191 **Verbascum thapsus** Linn

It is a fish poison and the seeds are narcotic

Bignoniaceae
(Bignonia Family)

192 **Dolichandrone falcata** Seem. (Vern.-H —Hawar, Bo -Manchingi, M -Kadatathie)

It is fish poison reputed to be abortifacient.

Pedaliaceae
(Sesamum Family)

Sesamol (a phenolic substance), seasmolin

193 **Sesamum indicum** Linn (-*S orrientale* Linn) (Vern.—S, H, B, & Bo -Til, M -Yelluchеddie

Seed cakes are commonly fed to cattle in India but it is stated to be toxic to livestock in Europe producing colic, tremors, dyspnoea and distantion.

Verbenaceae
(Verbena and teak Family)

194. **Callicarpa longifolia** Lamk var *lanceolaria* C. B. Clarke.
It is a fish poison

195 **Duranta repens** Linn (*D plumieri* Jacq)

It is very bitter and believed to be poisonous to livestock, but generally refused

196. **Lantana aculeata** Linn (-*L camara* Linn) (Vern -Bo.—Vhaneri, M -Aripu)

The reports about being poisonous to livestock received from the Punjab and Assam Government Departments described it to be abortifacient.

196A **Stachytarpheta jamaicensis** (Linn) Vahl var. *indica* Lam (-*S indica* Vahl.)

It is described as abortifacient

197 **Verbena officinalis** Linn (Vern.—P -Pamukh)

It is stated to be irritant poison

Labiateae

(Mint and sage Family)

Essential oils, saponins

198. **Eremostachys acanthocalyx** Boiss , *E vicaryi* Benth (Vern —P.-Gurgunna)

E acanthocalyx is stated to be poisonous and *E vicaryi* is used as a fish poison

199 **Lamium amplexicaule** Linn

It is regarded as injurious in America

200 **Pogostemon heyneanus** Benth (*P patchouli* F B I , non Pelletier) (Vern --H -Pacholi)

The leaves are used as insecticide.

Chenopodiaceae

(Spinach and beet Family)

Essential oils, saponins, salsoline, oxalic acid

201 **Chenopodium ambrosioides** Linn. *C botrys* Linn

Anthelmintic against hook-worm and round worm Fatal poisoning is on record

202 **Haloxylon recurvum** Benge ex Boiss , *H salicornicum* Bunge ex Boiss.

These are stated to be poisonous but *H. recurvum* is a favourite food of camels

203 **Salicornid brachiata** Roxb (Oomarie keeray) Ash is stated to be abortifacient

204. **Salsola kali** Linn.

It is suspected to be poisonous but a feeding test with half dried plants in flowering stage was negative

205 **Suaeda fruticosa** Forsk

It is stated to be poisonous.

Phytolaccaceae

(Phytolacca Family)

Bitter substances.

206 **Phytolacca latbenia** (Buch-Ham) H Walt. (*P. acinosa* Hook f., B I non-Roxb.) (Vern —H.-Matazor)

It is stated to be poisonous if eaten raw, but it is edible when cooked.

Polygonaceae

(Buck-wheat and rhubarb Family)

Rutin, essential oils, anthra-quinone derivatives, oxalic acid, oxalates.

207. **Fagopyrum esculentum** Moench, *F. tataricum* Gaertn.

It is commonly eaten but under certain conditions, not properly understood at present, produces eruptions and urticaria.

208 **Polygonum aviculare** Linn. (Vern —S -Nisomali, H -Bannatia, B -Machutie), *P flaccidum* Meissn , *P hydropiper* Linn. (B - Packur-mul), *P orientale* Linn., *P persicaria* Linn., *P. tomentosum* Willd

P hydropiper is biting to a degree that no animal will eat it. Acrid, emetic, vesicant, insecticidal and piscicidal properties to varying degree are strongly suspected.

209 **Rheum emodi** Wall (Vern —H. & B -Revandchini, Bo.-Ladaki-revanda chini, M -Nattu-ireval-chinni) and probably some other species

Its leaves and petioles are edible but the latter is responsible for occasional poisoning

210 **Rumex acetosa** Linn , *R acetosella* Linn (Vern —S. Chutrika, B - Chukapalam)

Oxalic acid poisoning is produced if eaten in excess.

Aristolochiaceae •

(Birth-wort Family)

Aristolochin, glucoside, essential oils, bitter substance.

211. **Aristolochia bracteata** Retz. (Vern —S.-Dhumrapatra, H.-Kirmar, M -Adutina-palai), *A. indica* Linn (Vern —S -Rudrajata, H. & B -Isharmul)

These are nauseous and bitter, emmenagogue and abortifacient. *A bracteata* is insecticide

Piperaceae

(Pepper Family)

Essential oils, piperine, piperovatine

212. **Piper sp.**

Harmful effects of *P. betle* Linn. and *P. nigrum* Linn. are well known.

Myristicaceae

(Nutmeg Family)

Essential oil (with myristicin), saponins.

213 **Myristica fragrans** Houtt., *M malabarıca* Lamk., (Vern —Bo.-Ramphal), possıbly some others also.

These are narcotıc and occasional cases of poısonıng are reported

Lauraceae

(Laurel Famıly)

Essentıal oıls

214. **Cassytha filiformis** Lınn

It ıs stated to be used as ınsectıcıde

215 **Cinnamomum camphora** F Nees (imported).

It ıs protectıve agaınst moths, counterırrıtant, systemıcally stımulates then depresses and paralyses central nervous system.

Thymeliaceae

(Mezereum Famıly)

Saponıns

216 **Daphne cannabina** Wall , *D oleoıdes* Schreb

These are severe gastro-ıntestınal ırrıtants. Camels do not eat *D oleoıdes*

217. **Edgeworthia gardneri** Meıssn.

It ıs a fish poıson

218. **Lasiosiphon eriocephalus** Dcne

Dust from drıed plant very ırrıtant and ıs not eaten by lıve-stock It ıs a fish poıson

219. **Wikstroemia viridiflora** Meissn. (*W. indıca* C. A Mey, var. vırıdıflora Hook. f)

It ıs a fish poıson.

Loranthaceae

(Mistletoe Famıly)

220. **Viscucm album** Lınn and possıbly others.

The poısonous properties are probably acquıred ıf growıng on poısonous hosts, e g. *Strychnos nux-vomıca.*

Euphorbiaceae

(Croton and eastor oıl Famıly)

Cyanogenetıc compounds, saponıns, crotononside, rıcınine, essentıal oıls, euphorbon, phenolıc substance, resıns, toxalbumins

221. **Andrachne cordifolia** Muell. Arg. (Vern·—P.Gurgulı).

It is reported to be cattle poıson and Afrıcan species are used as ınsectıcıde.

222 **Baliospermum montanum** Muell, Arg (-*B axillare* Blume) (Vern —S, H, & B -Danti, Bo -Dantimul, M.-Naga-danti).

Its seeds and oil are drastic purgative and the seeds in overdoses are acro-narcotic poison

223 **Buxus sempervirens** Linn. (Vern —Kash -Chikri, P -Papri)

It is stated to be fatal to camels, cattle and goats are probably immune

224 **Chrozophora rottleri** A Juss ex Spreng (-*C tinctoria* Hook f in part) (Vern —H -Subali, P -Kukronda)

It is emetic and cathartic and animals avoid it

225 **Cleistanthus collinus** Benth. & Hook f (Vern —M -Nachuta)

It is used as fish poison and occasionally as human poison An extract of it is a voilent gastro intestinal irritant.

226 **Croton oblongifolius** Roxb, *C tiglium* Linn (Vern —S - Kanakaphala, H -Jamalgota, B-Joypal, Bo.-Geyapal, M - Nervalam)

The seeds especially and the oil also is a drastic purgative and is reported to be poisonous The seeds are stated to be used as insectide and piscicide

227 **Euphorbia acaulis** Roxb, *E antiquorum* Linn (Vern —S - Vajrakantaka, H -Tridhara-sehund, B -Tekata sij, Bo -Naraseja, M -Shadhurakkalli), *E cattimandoo* W Elliot, *E helioscopia* Linn, *E hirta* Linn, *E hypericifolia*, Linn (Vern —Bo -Nayeti, P -Hazardana), *E neriifolia* Linn (Vern —S -Snuhi, H -Sehund, B -Mansa-sij, Bo.-Minguta, M -Ilaikal, *E. nivulea* Buch Ham, (S patta karie, B -Sij, Bo -Newrang, M -Aku-jemudu), *E peplus* Linn *E pilosa* Linn., *E rothiana* Spreng, *E royleana* Boiss (Vern – H. & P -Shakar pitan), *E thomsoniana* Boiss, *E thymifolia* Linn (Vern —S -Racta-vinda-chada, H -Chhoti dudhi, B - Dudiya, Bo -Nayeti, M -Sittrapaladi), *E tirucalli* Linn (Vern:— H.-Sehud, B -Lankasij, Bo -Shera, M -Kombu-Kalli), *E trigona* Haw.

Acrid and vesicant juice is found in most species and some are used as abortifacient when applied locally *E antiquorum*, *E. neriifolia*. *E royleana*, *E tirucalli* are fish poisons and *E. antiquorum*, and *E thymifolia* are stated to be used as insecticides, some are poisonous to livestock

228. **Excoecaria agallocha** Linn (Vern —B -Gangwa, B -Geva, M - Chilla)

Its fresh sap is extremely acrid and causes intolerable pain if it gets into the eye The woodcutters have suffered and call it blinding tree It is also fish poison

229 **Fluggea leucopyrus** Willd, *F virosa* Baill (*F microcarpa* Bl) (Vern —H.-Dalme, B Pandharphali)

It is a fish poison and is used to destroy worms in sores.

230. **Hura crepitans** Linn.

Its seeds and oil are violent purgative, milky juice very irritant

231 **Jatropha curcas** Linn, *J glandulifera* Roxb, *J gossypiifolia* Linn, *J multifida* Linn

These are violent purgative like *Croton* sp and *J curcas* is a fish poison

232 **Manihot esculenta** Crantz (*M utilissima* Pohl.) (Vern —Baz - Cassarva M -Maravuli

Its fresh tubers are extremely poisonous and cassava or tapioca meal is specially prepared

233 **Phyllanthus urinaria** Linn (Vern —S -Tamara valli, H & B - Hazarmani, M -Shiyappunelli)

It is stated to be a fish poison

234 **Ricinus communis** Linn (Vern —S -Eranda, H -Arand, B.- Verenda, Bo -Erendi, M -Amanakham chedi)

The seeds produce violent grastro-enteritis, subcutaneously very poisonous The oil is stated to be an active poison for flies

Plant is a fish poison

235 **Sapium indicum** Willd (Vern — B -Hurua, Bo -Hurna), *S - insigne* Trimen (Vern —H -Khinna, Bo -Dudla)

S indicum juice is narcotic poison The fruit is extremely nauseous and seeds are fish poison *S insigne* juice is vesicant

236 **Tragia bicolor** Miq, *T involucrata* Linn (with varieties) (Vern — S -Vrischikali, H -Barhanta, B -Bichuti, Bo -Kanchkuri, M - Kanchuri-vayr)

These are stinging nettles

Urticaceae

(Nettle, hemp and mulberry Family)

α-β & γ-antiarin, saponin, resin containing cannabindol (toxic), formic acid

237 **Antiaris toxicaria** Lesch O (Vern —Bo -Chandla, M.- Nettavil, Sing -Riti, Burma -Hmyaseik)

Its sap is used as an arrow poison, it is a powerful heart poison

238 **Cannabis sativa** Linn. (Vern —S -Ganjika, H, B & Bo-Ganja, M -Bhangi)

The preparations of bhang, charas and ganja are well known in India, excessive indulgence produces physical and mental injury. Stated to be used as a fish poison in Bengal It is spread on beds to drive away bugs.

239. **Ficus sp.**

Some species contain acrid juice, according to Watt fruit of *F bengalensis* is poisonous to horses.

240. **Fleurya interrypta** Gaud.

Stings.

241. **Girardinia leschenaultiana** Dcne , *G zeylanica* Dcne.

These are stinging nettles.

242. **Laportea crenulata** Gaud., *L terminalis* Wight

These are stinging nettles

243 **Urtica dioica** Linn , (Vern —H & P -Bichu), *U. hyperborea* Jacq., *U parviflora* Roxb., *U. pilulifera* Linn.

These are stinging nettles.

Juglandaceae
(Walnut Family)

244. **Juglans regia** Linn (Vern —S -Akshota, H. & B -Akhroot, Bo - Akroda, M -Akrottu).

The rind of unripe fruit is stated to be fish poison in Jaunsar and Tehri Garhwal

Myricaceae
(Sweet-gale Family)

Essential oils, myricelin).

245. **Myrica nagi** Thunb. (Vern·—S.-Katphala, H., B & Bo -Kaiphal, M.-Marudam-pattai).

Bark is stated to be used as fish poison in Khasia hills.

Gnetaceae
(Gnetum Family)

Saponins, bitter substance

246 **Gnetum scandens** Roxb.

It is a fish poison

Conifereae
(Pine Family)

Essential oils, taxine, taxicatin.

247 Several members especially *Taxus baccata* Linn.

Most members possess toxic essential oils and poisoning due to the use of Juniper oil as abortifacient is reported. Deaths in man and animals due to eating the berries and leaves of *T. baccata* are reported and the seeds are very poisonous.

Iridaceae
(Iris Family).

Saponins, picrocrin (bitter substance), essential oils.

248. **Crocus sativus** Linn. (Vern—S-Kumkuma. H., B & Bo-Jafran, M-Kungumapu)

Bulbs are toxic to young animals and stigmas in overdoses are narcotic poison. It is used as abortifacient

Amaryllidaceae

(Amaryllis and Agave Family)

Saponin, Lycorine, tazetitne.

249 **Agave americana** Linn (Vern—H-Kantala, B-Jungli anarash)

It is stated as fish poison and it is also stated to be toxic to livestock under field conditions The wall paper impregnated with expressed juice is said to be proof against white-ants

250 **Cirnum asiaticum** Linn Vern—S-Vishamandala, H Pindar B-Bara-kanur, Bo-Nagdowan, M-Vishomangil), *C. lotifolium* Linn (Vern—H & B Sukh-darsan)

251 **Narcissus tazetta** Linn (Vern—P Nargis)

Its bulbous roots are emetic and purgative, and produce irritant poisoning in overdoses

Taccaceae

252. **Tacca pinnatifida** Forst (Vern—Bo-Diva, M-Karachunai)

The tuber is intensely bitter, acrid and poisonous when fresh, yields nutritious starch by maceration and repeated washing.

Bromeliaceae

(Pine-apple Family)

253 **Ananas comosus** Merr (—*A sativus* Schult) (Vern—H.-Anannas, B.-Anaras, M-Anasha pazham).

The juice of leaves and unripe fruit is purgative and is sometimes used as abortifacient.

Dioscoreaceae

(Yam Family)

Dioscorine, glucoside (toxic).

254 **Dioscorea bulbifera** Linn. *D hispida* Dennst, (—*D. daemona* Roxb), *D prazeri* Prain & Burk (—*D deltoidea* Wall.).

Tubers are very acrid but in most cases boiling makes them edible

Liliaceae

(Lily Family)

Imperialine, colchicine, methyl-colchicine, saponine, borbaloin emodin, sicaloin, resin, essential oils, etc.

255. **Allium sativum** Linn (Vern—S-Lasuna, H. & Bo. Lasan, B.-Rasun, M.-Vallaipundu)

Its essential oil is very irritant and pungent, produces irritant poisoning in excess. It is also stimulant, narcotic and anthelmintic.

256 **Aloe species.**

Inspisated juice 'Mushabbar' of commerce is a powerful drastic purgative and fatal cases are reported from its use. It has been used to procure abortion

257. **Colchicum luteum** Baker (Vern —Surinjan)

Resembles closely the foreign *C autumnale* which is poisonous and produces gastro-intestinal irritation The Indian species is also poisonous

258 **Fritillaria imperialis** Linn.

The bulbs are toxic when fresh and are said to act as heart poison.

259 **Gloriosa superba** Linn (Vern —S -Sukra puspita, H -Kalihari, B -Bishlanguli, Bo.-Karianag, M -Agnişikha)

The root is stated to be sometimes used for suicidal purposes and as abortifacient, it is an acronarcotic poison The juice of leaves is stated to be used to destroy lice in hair

260 **Scilla iddica** Baker

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261. **Urginia coromandeliana** Hook. f., *U indica* Kunth (Vern —S.-Vana-palandam, H & B.-Jangli piyaz, Bo.-Jangli-kanda, M - Nari-vengayam)

The bulbs are irritant poison The foreign species *U. scilla* is a fish poison, as also is the Indian representative

Juncaceae

(Rush Family)

262 **Juncus effusus** Linn

It is suspected to be poisonous to livestock in South Africa This and other species in India are worth investigating.

Palmaceae

(Palm Family)

Arecaine, arecolidine, arecoline, guvacine, guvacoline, saponins

263 **Areca catechu** Linn (Vern —S -Gubak, H & B -Supari, Bo - Sopari, M Kamugu)

Young and undried nut when chewed in excess gives rise to temporary giddiness It also produces gripping and strong intestinal irritation, resulting in loose motions.

264. **Arenga obtusifolia** Mart.

Juice from fruit is used in Malaya to poison enemies and *A obtusifolia* is stated to be used as fish poison.

265 **Corypha umbraculifera** Linn. (Vern —S.-Alpayushi, M.-Talipanai)

The fruit is stated to be used as fish poison.

266 **Wallichia disticha** T Anders.

Watt states that berries and perhaps the leaves are irritant to skin

Araceae
(Aroid Family)

Calcium oxalate (acicular crystals), bitter substance, sharp acrid substance, essential oil (alkaloid and saponin in foreign plant)

267 **Acorus calamus** Linn (Vern —H & B.-Bach, Bo -Vaj, M Vashambu), *A gramineus* Soland

Roots are stated to be used as effective isecticides and insectifuge Doubtful case reported when *A calamus* proved poisonous to camels during the Afghan Campaign The rhizome is used in medicine but in overdoses produces violent and persistent emesis.

268 **Alocasia indica** Schott (Vern —S.-Manaka, H -Mankenda, B - Mankachu), *A montana* Schott, *A odora* (Roxb) C Koch (-*A macrorhiza* Schott)

Fresh tubers are acrid and irritant

269 **Amorphonphallus campanulatus** (Roxb) Bl *A lyratus* Engl, *A sylvaticus* (Roxb) Kunth (*Sunantherias sylvatica* Schott)

Fresh tubers are acrid and irritant and the seeds are intensely acrid Seeds of *A sylvaticus*, like *Plesmonium*, and fruit are intensely acrid

270 **Arisaema speciosum** Mart (Vern —P -Kiralu), *A tortuosum* Schott (Vern —P -Samp-ki-kumb)

The tubers are poisonous and have insecticidal properties. The fruit is also probably poisonous

271 **Homalomena rubescens** Kunth

It is stated to be poisonous

272 **Lagenandra ovata** (Linn) Thw (-*L toxicaria* Dalz) (Vern:—Bo - Rukh-alu, M.-Maravara Tsjembu)

It is stated to be very poisonous and has insecticidal properties.

273. **Plesmonium margaritiferum** Schott

Its crushed seeds produce local anaesthesia and it is used as a cure for toothache

274 **Sauromatum guttatum** Schott.

Tubers are regarded as very poisonous.

275 **Steudnera virosa** (Kunth) Prain (-*Colocasia virosa* Kunth.).

It is believed to be poisonous.

276 **Thomsonia nepalensis** Wall

It is acrid when fresh.

277. **Typhonium trilobatum** Linn. Schott. (Vern.—B -Ghet-kachu, M.-Karunaikkizhangu).

Fresh tubers are exceedingly acrid

Cyperaceae
(Sedge Family)

Essential oil.

278 **Carex cernua** Boott

It is said to be one of the causes of 'vlei' poisoning in cattle in South Africa.

279. **Cyperus longus** Linn

It is regarded as poisonous in South Africa.

280. **Scirpus corymbosus** Heyne

See *Carex cernua.*

Gramineae
(Grass Family)

Cyanogenetic glucosides, hydrocyanic acid, temuline, saponins, oxalic-acid, selenium protein (toxic)

281 **Avena fatua** Linn (Vern —H -Kuljud), *A sativa* Linn

It is good fodder but occasionally deleterious probably on account of 'hair balls' that are developed in the stomach

282 **Bambusa bambos** Druce (-*B. arundinacea* Willd) (Vern:—S -Vansa, B & H -Bans, Bo.-Mandgay, M -Mangal).

Fresh young shoots are stated to have insecticidal properties

283. **Dendrocalamus strictus** (Roxb.) Nees (Vern:—H -Bans kaban, B -Karail, Bo -Bas, M.-Kanka).

The leaves are stated to be used to procure abortion

284 **Lolium perenne** Linn., *L. temulentum* Linn (H -Machni)

Several cases of poisoning, mostly non-fatal in man and animals, from eating the seeds of *L temulentum* have been recorded Gastro-intestinal irritation and severe nervous symptoms are reported.

285. **Panicum maximum** Jacq

It is suspected to be responsible for the production of 'Dikoor', a disease affecting young sheep in Africa.

286. **Paspalum scrobiculatum** Linn (Vern —S.-Kodrava, H.-Kodo, B -Kodoa, dhan, Bo -Kodra, M -Kiraruga).

The 'kodra' poisoning is very similar to *L temulentum* poisoning, the animals suffer much more than men The animals should be prevented from grazing the crop when ripening

287 **Sorghum halepense** (Linn) Pers (Vern —H -Baru, B -Kala-mucha), *S saccharatum* Pers (Vern —H & Bo -Deo-dhan, M - Tellajonna), *S vulgare* Pers (Vern —S Javanala, H , B & Bo - Jowar, M -Cholam)

These are good fodder but occasional poisoning is reported with stunted growth, under drought conditions. The frosted leaves, or second growth is dangerous

288 **Stipa sp** (some)

It is believed to be poisonous and mechanical action of 'seeds' may not be overlooked

289. **Triticum aestivum** Linn (Vern —S -Godhum, H -Gehun, Bo - Gam, M -Godumai)

Under certain conditions it becomes deleterious fodder.

290 **Zea mays** Linn (Vern —S -Yavanala, H. & B -Bhutta, Bo.- Makai, M -Makka-scholam)

The pollen from it is stated to be a possible cause of hay fever It is said to be occasionally responsible for deleterious effects, as yet not fully understood

CHAPTER IX

We have studied the literature on Indigenous Systems of Medicine as practiced in India with a view to find out the uses to which different medicinal plants have been put in the treatment of various important diseases For instance certain plants have the reputation of being effective in the treatment of bowel diseases particularly dysentery and cholera Others are said to be useful in the treatment of prolonged fevers such as the group of enteric fever Certain other plants are alleged to be effective in the treatment of tuberculosis (pulmonary) Yet another group is considered to have action on genital organs and emenagogue and abortifacient properties are attributed to them Investigation on some of these plants has been carried out and brief summaries of the results achieved are given Others marked with an asterisk have not been investigated so far and will form a field for research for the investigators

Besides these certain plants are considered to have insecticidal and insect-repellent properties and another allied group is toxic to fishes These, as has been already indicated, are a very important group from point of view of control of insect and other pests which do incalculable harm to man, livestock and agricultural crops

The object of giving these lists is to bring these to the notice of those who are interested in indigenous drugs To the lay public these will be of general interest, as they will find many names of common plants growing at their very door which have been considered effective in the treatment of common ailments and are household remedies For the research worker these lists will open up a field for investigation and will give an idea as to the avenues in which investigations might be directed

Indian Medicinal Plants Alleged to be useful in Tuberculosis in the Indian Indigenous Medicine.

1 ABRUS PRECATORIUS Linn

2 ADHATODA VASICA Nees

3. AEGLE MARMELOS Corr

4 ALANGIUM SALVIIFOLIUM (Linn) Wang Syn -*A lamarckii* Thwaites.

*5 ALBIZZIA JULIBRISSIN Durazz , (B -Kalkora, H -Lal siris) , outer Himalaya from the Indus to Sikkim, ascending upto 6 000 to 7,000 ft

*6 ALBIZZIA LEBBECK Benth , (S -Shirisha, H , B & Bo -Siris) , throughout India, ascends to 4,000 ft in the Himalayas usually planted

*7 ALLIUM CEPA Linn , (S -Palandu, H -Piyaz, B -Piyaj, Bo.-Kanda), extensively cultivated all over India.

8 ALLIUM SATIVUM Linn.

*9. ALLIUM SCHOENOPRASUM Linn., Kashmir to Kumaon 8,000 ft to 11,000 ft, grown as a garden crop

10. ALPINIA GALANGA Swartz

11. ASCLEPIAS CURASSAVICA Linn

*12 ASPARAGUS RACEMOSUS Willd, (S & B -Shatamuli, H -Shatawar, Bo -Satavari) Himalayas, from Kashmir eastwards

13. AZADIRACHTA INDICA A Juss, Syn *Melia azadirachta* Linn

*14 BAUHINIA RACEMOSA Lam, (S -Svetakanchan, H -Kanchnal), throughout India.

*15 BAUHINIA VARIEGATA Linn, (S -Kovidara, H -Kachnar, B -Rakta kanchan), sub-Himalayan tract from Indus eastwards, dry forest of Eastern, Central & South India

16 BUTEA MONOSPERMA (Lam.) Kuntze

*17 CANSCORA DECUSSATA Schult, (S -Sankhapuspi, H -Sankhaphuli), throughout India upto 4,000 ft, grows in moist situations

*18 CAPPARIS SPINOSA Linn, (S -Kakadani, H & P -Kabra), plains between the Indus & Jhelum, Salt Range, Chamba, Kumaon, Nepal, Deccan, W Ghats, Baluchistan, Wazirstan

19 CASSIA FISTULA Linn

*20 CASSIA TORA Linn Syn -*C obtusifolia* Linn, (S -Chakramards, H & Bo -Chakunda), throughout India

*21 CHIONACHNE KOENIGII (Spreng) Thw *Polytoca barbata* Stapf (B -Gurgur, H -Kansa, S -Kanda), throughout India in hot and damp parts

22 CIMICIFUGA FOETIDA Linn, (P -Jiunti)

23 CITRULLUS COLOCYNTHIS Schrad

*24 CLERODENDRON SERRATUM (Linn) Moon, (H -Barnagi, S & Bo -Bharangi), more or less throughout India

25 CLITORIA TERNATEA Linn.

26 COCCINIA CORDIFOLIA Cogn. Syn -*C indica* W & A, *Cephalandra indica* Naud

*27. COCCULUS HIRSUTUS Diels, (B -Hayer, Bo -Vasanvel, H.-Jamti-ki-bel), from the foot of the Himalayas to S India

*28 COCOS NUCIFERA Linn, (H -Nariyal, Bo -Narel, M -Tanba), cultivated in the hot damp regions of India especially near the sea

*29 COMMIPHORA AGALLOCHA Engler (B, Bo & H -Guggul), Assam, Sylhet, Bengal, Madhya Pradesh

30. COMMIPHORA MUKUL Engl, Syn.-*Balsamodendron mukul* Hook. ex Stock, Bellary, Mysore, Khandesh, Kathiawar, Rajasthan, Sind, Baluchistan.

*31. CORIANDRUM SATIVUM Linn, (S.-Dhanyaka, H. & B -Dhania); extensively cultivated throughout India.

*32. CRATAEVA NURVALA Ham ; (H -Barun, S -Varuna) almost all over India, wild or cultivated, often found along streams

*33 CRESSA CRETICA Linn , (H & B -Rudranti, Bo -Khardi), throughout India

*34. CUMINUM CYMINUM Linn , (S Jiraka, H -Jira, Zira, Tam.-Shiragam); cultivated throughout India (except Bengal & Assam),

*35 CURCUMA ANGUSTIFOLIA Roxb , (H & B -Tikhur Tam -Kua), outer ranges of Central Himalayas, Bihar, Bengal

*36. CURCUMA ZEDOARIA Bose

*37. DIOSPYROS MELANOXYLON Roxb , (H -Kendu, B Kend, Bo -Temru), deciduous forests of the Madhya Pradesh, Bihar, W. Peninsula, Chota Nagpur.

38 DRYNARIA QUERCIFOLIA J Sm

39. ELETTARIA CARDAMOMUM Maton

*40 EMBELIA TSJERIAM-COTTAM A Dc (H -Bayabirang, Bo -Barbatti)' Ceylon, Malabar Coast, Sylhet and Assam

*41. EULOPHIA NUDA Lindl , (S -Manya, H -Goruma, H -Badbar) Tropical Himalaya, Nepal to Sikkim, Assam, Khasia Hills, Chota, Nagpur, Manipur, W Peninsula

*42 FRITILLARIA CIRRHOSA Don Prodr , Central & E Himalayas, Sikkim, 11,000 to 16,000 ft

*43 FRITILLARIA ROYLEI Hook , Kashmir to Kumaon, 8,000 to 13,000 ft

*44 GERANIUM ROBERTIANUM Linn , Kashmir to Garhwal

45 GLYCYRRHIZA GLABRA Linn

*46. GMELINA ARBOREA Linn , (S -Gumbhari, H -Kambari), throughout India

*47 GOSSYPIUM ARBOREUM Linn , (H -Nurma, P -Papas), Indian gardens.

*48 GRAPTOPHYLLUM PICTUM (L) Griff , (M.-Ysjudemaram), Indian gardens

*49 GREWIA ASIATICA Linn (S -Parusha, H. & B.-Phalsa) , extensively cultivated throughout India

*50. HAUCLEA SESSILIFOLIA Roxb

*51 HYSSOPUS OFFICINALIS Linn ; (Zufah-Yabis), Kashmir to Kumaon, 9,000 to 11,000 ft

*52 INDIGOFERA TINCTORIA Linn , (S -Nilika, H & Bo.-Nil) , widely cultivated in many parts of India

*53. JASMINUM AURICULATUM Vahl , (S. & Tel , Magadhi) ; Deccan, Carnatic, W. Peninsula.

*54 LACTUCA SERRIOLA Linn. Syn *L scariola* Linn. (H -Kahoo, B.-Salad); W Himalaya, 6,000-12,000 ft.

*55 LEEA AEQUATA Linn, (S, H. & B -Kakajangha), Sikkim, Himalaya, Assam, East Bengal, Sylhet, Andamans.

56. LINUM USITATISSIMUM Linn

*57. LITSEA CHINENSIS Lam (H -Garbijaur, B -Kukarchita), throughout the hotter parts of India

*58. LORANTHUS ASPER Lour

59. LUFFA ACUTANGULA var *amara* Clarke

60 LUFFA ECHINATA Roxb Host Beng

61 LUVUNGA SCANDENS Ham.

*62 MACHILUS MACRANTHA Nees., (Tam -Kolamavu, Mal -Uravu), W Peninsula

*63 MARTYNIA ANNUA Linn, (H -Bichu, B -Baghnoki, Tel -Garudamukku), naturalized in India

*64 MELISSA PARVIFLORA Benth, (H -Bililotan), Garhwal to Sikkim & Mishmi, Khasia hills

*65 MIMUSOPS HEXANDRA Roxb, (S -Rajadani, H -Khirni, M -Palla), upper Gangetic plain, Madhya Bharat, S India

*66 MOMORDICA DIOICA Roxb, (S -Vahisa, M -Palupaghel kalung), throughout India, ascending to 5,000 ft in Himalayas

67 MORINGA OLEIFERA Lam

68 MUSA SAPIENTUM O Kuntze.

*69 OCHNA PUMILA Ham ex D Don, (Santh -Champabaha), Kumaon to Sikkim, Bihar, Chota Nagpur

*70. OLDENLANDIA UMBELLATA Linn, (M.-Saya, H -Chirval), Orissa, Bengal, Deccan, Circars, Carnatic

71. OPERUCLINA TURPETHUM (Linn) Silva Manso.

*72 PHASEOLUS ACONITIFOLIUS Jacq (H -Mat, Tam -Tulkapyre), Himalayas to Ceylon

*73. PHASEOLUS TRILOBUS Art, (H. & B.-Mugani), Himalayas to Ceylon and Burma

*74 PIPER CHABA Hunter (H B & Bo.-Pan), cultivated in various parts of India

*75 PIPER LONGUM Linn., (S -Pippali, H.-Pipal), hotter states of India.

76. PINUS ROXBURGHII Sargent, Syn.-P *longifolia* Roxb.

77 PISTACIA INTEGERRIMA Stew.

*78 PISTIA STRATIOTES Linn, (H -Jalqumbhi, Bo -Prashni), throughout India in still sweet waters

*79 PLANTAGO MAJOR Linn, (H -Lahuriya, Bo Bartang), Assam, Khasia hills, W Ghats, Konkan, Nilgiris, Pulneys, Baluchistan

80. PLUMBAGO ZEYLANICA Linn.

*81 RHODODENDRON CAMPANULATUM Wall. ex G Don., (H.-Cherailu, Kash -Gaggar), alpine regions from Kashmir to Bhutan

82. RHUS SUCCEDANEA Linn

*83 SANSEVIERIA ROXBURGHIANA Schult , (B.-Murba, Bo -Morwa), Coromandel coast

*84 SANTALOIDES MINUS Schellenb. Syn -*Rourea santaloides* W & A , (B -Vitaraka, Bo -Vardara), Konkan, S M Country, Kanara to Travancore

*85 SAPINDUS TRIFOLIATUS Linn (S -Phemila H , B & Bo -Ritha).

*86. SESBANIA SESBAN (Linn) Merr Syn -*S aegyptiaca* Pers , (H & B - Jayanti), plains from the Himalayas to Ceylon, ascending upto 4,000 ft in north-west

87. SIDA CORDIFOLIA Linn

88 SIDA RHOMBIFOLIA Linn

*89 SOLANUM TRILOBATUM Linn , (S -Alarka, M -Tudovullay), Gujerat, Deccan, S M Country, N Circars, Carnatic

*90. SPHAERANTHUS INDICUS Linn , (S -Munditika, H & Bo -Gorakmundi), throughout India, ascending the Himalayas upto 5,000 ft. from Kumaon to Sikkim

*91. SPONDIAS PINNATA Kurz , (S -Amrataka, H , B & Bo -Amra), from the Chenab eastwards, Salt Range, Andamans, W Indian Peninsula

92 STEPHANIA GLABRA Roxb

*93. STREBLUS ASPER Lour , (H. Siora, B -Sheora), drier parts of India, Travancore, Andamans

*94. TERAMNUS LABIALIS Spreng , (S -Masha-Parui, H -Mashparui), throughout India

*95. URTICA DIOICA Linn., (H & P -Bichu), N W. Himalaya, from Kashmir and the Salt Range to Simla, 8,000-10,700 ft.

*96 VANDA SPATHULATA Spreng , (Mal -Ponnam-penmaraiva), W Peninsula from Malabar to Travancore

*97. VATERIA INDICA Linn , (S -Ajakarua, H -Safed damar), Western India, from N. Kanara to Travancore, chiefly in evergreen forests, Coorg.

98 VERBASCUM THAPSUS Linn

*99 VERNONIA CINEREA Less., (S & H -Sahadevi, B -Kukseem), throughout India, ascending to 8,000 ft in the Himalaya Khasia and Peninsula mountains

*100. VERNONIA ROXBURGHII Less, Upper Gangetic Plain, Kumaon, Bengal, Central & W. India.

101 WITHANIA SOMNIFERA Dunal.

*102. ZIZYPHUS JUJUBA Lam., (S -Badari, H.-Baer, B -Kul), indigenous and naturalized throughout India, in the Outer Himalaya upto 4,500 ft.

Indian Plants Considered to be useful in Dysentery in Indian Indigenous Medicine.

1 ABRUS PRECATORIUS Linn.

*2 ABUTILON INDICUM Sw, (H-Kanghi, B.-Potari), throughout the hotter parts of India

*3 ABUTILON THEOPHARSTIC Medic, (S-Jaya, Bo-Nahani khapat), N W India, Sind, Kashmir, Bengal

*4 ACACIA ARABICA Willd, (H-Kikar, B-Babla), naturalized in all parts of India, indigenous to Sind and the Deccan.

*5 ACACIA CATECHU Willd, (H-Khadira, H-Khair), Punjab, N. W. Himalaya, Central India, Bihar, Ganjan, Konkan, Deccan

*6 ACACIA FERRUGINEA DC, (Nep-Khour, Bo-Ker), Gujerat, Berar, Circars, Deccan, Konkan, Carnatic, W Ghats

7 ACORUS CALAMUS Linn

*8 ADENSONIA DIGITATA Linn, (H & Bo-Gorakh-amli,), occasionally cultivated in some parts of Uttar Pradesh, Bihar, Bombay & Madras

9 ADHATODA VASICA Nees

*10 ADIANTUM LUNULATUM Burm, (H & B-Kali-Jhant, Bo-Hansraj), throughout N India in moist places, South India

11 ADINA CORDIFOLIA Benth

12 AEGLE MARMELOS Corr.

*13 AGARICUS OSTREATUS (Jacq) Fries., (Bo-Phanasa-alambe)

*14 AGERATUM CONYZOIDES Linn; (B-Dochunty, Bo-Osari), throughout India upto 5,000 ft

15 AILANTHUS ALTISSIMA (Mill) Swingle, Syn—*A glandulosa* Desf; (English-Ailanto).

*16 AILANTHUS EXCELSA Roxb, (H-Mahanimb, Tam-Peruppi), Bihar, Chota Nagpur, Madhya Pradesh, Ganjam, Vizagapatnam, Deccan

*17 AILANTHUS MALABARICA DC, (Bo-Guggula-dhup Tel-Maddi-palu), Konkan, Deccan, W Ghats.

18 ALBIZZIA LEBBECK Benth

19 ALSTONIA SCHOLARIS R Br.

*20 ALTHAEA ROSEA Cav, Indian Gardens

*21 AMARANTHUS TRICOLOR Linn Syn—*A gangeticus* Linn.; (H-Lal-sag, S-Marisha), cultivated throughout India

*22 AMOMUM XANTHIOIDES Wall., (H-Ilayechi, Tam.-Elam), Tavoy, Tenasserim.

23 ANDROGRAPHIS PANICULATA Nees, (S.—Bhunimba, H-Kiryat).

*24. ANNONA MURICATA Linn; (S-Mullanjakka, Tam.-Mullu-chitta); grown to a small extent in Assam.

25 ANNONA RETICULATA Linn

*26. ANTHOCEPHALUS INDICUS A. Rich Syn -*A cadamba* Miq S. & H.-Kadamba), sub-Himalayan tract from Nepal to Burma, Circars and W. Ghats.

27. ANTIARIS TOXICARIA Leschen

*28. ASPARAGUS ADSCENDENS Roxb , (H -Safed mush, Gharwal-Jhirna), Punjab & the Himalayas upto 5,300 ft

29. ASPARAGUS RACEMOSUS Willd

*30. ASTERACANTHA LONGIFOLIA Nees , (H -Tal-makhana, S -Kakil-akshya) throughout India in moist places

*31. AVERRHOA CARAMBOLA Linn , (H -Karmal, M -Tamarta), gardens in hotter parts of India as far north as Lahore

32 BALANITES AEGYPTIACA Del Syn -*B roxburghii* Planch.

*33. BARRINGTONIA ACUTANGULA (Linn) Gaertn (B -Hijal, H -Hijjal), common in the sub-Himalayan tracts east of the Madhya Pradesh, Jumna, Bihar, Orissa, Bengal, Assam, S. India

*34 BASELLA RUBRA Linn , (S -Potaki, H Lalbachlu), throughout India, wild & cultivated

35. BAUHINIA RACEMOSA Lam

*36. BAUHINIA TOMENTOSA Linn , (S -Aswamantaka, H -Kachnar, Bo - Asundro, M -Kanchnine), N W States, Circars, Carnatic, often cultivated in other parts of India

37 BAUHINIA VARIEGATA Linn

*38 BERGENIA LIGULATA (Wall) Engl. (B -Patharchuri, Bo Pashan-bheda), temperate Himalayas, from Kashmir to Bhutan, between 7,000-10,000 ft Khasia hills

*39 BIDENS TRIPARTITA Linn , Central & W Himalaya from Nepal to Kashmir, W Tibet

*40 BOSWELLIA SERRATA Roxb , (S -Shallaki, H & B -Luban), Madhya Pradesh, Deccan, Bihar, Orissa, Rajasthan, Madhya Bharat, Gujerat

*41. BOTRYCHIUM LUNARIA Sew , (English-Moonwort), common from Kashmir to Sikkim ascending upto 13,000 ft , extending to Koraka-ram Range

42. BRASSICA CERNUA (Thunb) Forbes & Hemsley

43 BRUCEA AMARISSIMA (Lour) Merr Syn -*B sumatrana* Roxb.

44. BUTEA MONOSPERMA O Kuntze.

*45. CAESALPINIA JAYABO Maza; (Arab -Bunduk, Tam.-Kalarisikkodi), Indian Peninsular region

*46 CALAMUS ROTANG Linn , (S.-Vetasa, H., B & Bo.-Bet), Madhya Pradesh, Deccan, Carnatic.

47. CALOTROPIS GIGANTEA R. Br.

48. CARAPA MOLUCEENSIS Lam.

49. CARUM BULBOCASTANUM Koch (H.-Kalajira, Kash -Guniyan); Kashmir, Baluchistan

50 CARUM CARVI Linn

*51 CASSIA AURICULATA Linn., (H & B -Taruar, Tam.-Avaram), wild in the dry regions of Madhya Pradesh, W Indian Peninsula, Rajasthan, cultivated in other parts of India.

52 CASSIA FISTULA Linn

53 CASSIA TORA Linn

54 CASSYTHA FILIFORMIS Linn

*55 CASUARINA EQUISETIFOLIA Linn ; (H -Jang'isaru, B -Belatijau), from Chittagong Southwards

56 CEDRELA TOONA Roxb

*57 CELSIA COROMANDELIANA Vahl (S -Kulahala, Bo -Kolhal), throughout India

58 CENTELLA ASIATICA (Linn.) Urban Syn —*Hydrocotyle asiatica* Linn.

*59 CEROPEGIA TUBEROSA Roxb.; (P -Galot, Bo -Khappar kadu, M - Manda), Konkan, Deccan, S. M. Country Circars.

*60. CINNAMOMUM INERS Reinw , (Bo.-Tikhi, H -Jangli darchini), evergreen forests of W Ghats, Carnatic, Sheoroy & Kollimalai

61 CLITORIA TERNATEA Linn

*62 CORALLOCARPUS EPIGAEUS Benth ex Hook f , (S -Patalagaruda), Punjab, Sind, Gujerat, Rajputana, Deccan, Carnatic.

*63 CORCHORUS CAPSULARIS Linn , (S -Kalasaka, H. & B.-Narcha), throughout the hotter parts of India

*64 CORCHORUS FASCICULARIS Lam , (B.-Bilnalita, Bo -Hirankhori), throughout the hotter parts of India

65. CUMINUM CYMINUM Linn

*66 CYDONIA OBLONGA Mill Syn -*C vulgaris* Pers., (H -Bihi, S.-Amritphala), cultivated in Punjab, Kashmir, Nilgiris

*67. CYLISTA SCARIOSA Roxb. (Bo -Ranghevada), Madhya Pradesh, West & South India.

68 CYNODON DACTYLON Pers (H., B & Bo -Dhub), throughout India ascending to 8,000 ft. in the Himalaya

*69 CYPERUS ROTUNDUS Linn , (S & Bo -Musta, B & H -Mutha), throughout India, common in waste grounds, gardens, road sides, in open spots & upto an elevation of 6,000 ft

*70. CYPERUS SCARIOSUS R. Br ; (S -Nagar mustaka, H & B -Nagar Motha) damp places in Bengal, Uttar Pradesh, eastern & southern parts of India.

71 DAUCUS CAROTA Linn

*72 DESCURAINIA SOPHIA Linn , (H.-Khubkallana), Kashmir to Kumaon upto 14,000 ft , E Himalaya, Salt Range Peshawar, Baluchistan

*73 DESMODIUM GANGETICUM DC , Outer Himalaya upto 5,000 ft. & throughout India

74. DIOSPYROS MELANOXYLON Roxb

*75 DIOSPYROS PEREGRINA Gurkein , (S -Tinduka, H & B -Gab, Bo - Tendu) , throughout India

*76. ELAEOCARPUS SERRATUS Linn ; (B -Julpai, M -Olang-karai) W Indian Peninsula

77 ERIGERON CANADENSIS Linn

78 EUPHORBIA ANTIQUORUM Linn

79 EUPHORBIA HIRTA Linn

80. EUPHORBIA HYPERICIFOLIA Linn

81. EUPHORBIA THYMIFOLIA Linn

*82 EVOLVULUS ALSINOIDES Linn , (S -Vishnugandhi, H -Sankha pushpi) Tropical and sub-tropical regions of India

83. FAGONIA CRETICA Linn

*84 FERONIA LIMONIA (Linn) Swingle, Syn —*F elephantum* Corr , (Kapittha, H -Kavitha) ,indigenous in S India, cultivated in many parts of India.

*85 FICUS BENGALENSIS Linn , (S -Vata, H -Bor, B -Bar) , sub-Himalayan tract, W Peninsula, planted elsewhere

*86. FICUS HETEROPHYLLA Linn , (S -Trayamana, B -Bhui-dumur) , throughout hotter parts of India

*87. FICUS HISPIDA Linn , (S -Kakadumbura, H -Konea-dumbar) more or less throughout India

*88. FICUS RACEMOSA Linn Syn —*F glomerata* Roxb , (S -Udumbara, H -Gulari) , throughout India

*89. FIMBRISTYLIS JUNCIFORMIS Kunth , (Santh -Bindimuthi), Madhya Pradesh, W Peninsula.

90. FLEMINGIA TUBEROSA Dalz (Bo -Birmova), Konkan

91. FOENICULUM CAPILLACEUM Gilb , Syn —*F vulgare* Gærtn

92. GARCINIA MANGOSTANA Linn , (H., B & Bo -Mangustan), cultivated in Madras State, Nilgiris

93 GASTROCHILUS PANDURATA Ridleys , Konkan, Andamans

94. GOSSYPIUM HERBACEUM Linn. , (H., B & Bo -Kapas, S -Karpas), cultivated in N. W Frontier region of Pakistan, Baluchistan

95. GREWIA HIRUSTA Vahl.

96. GREWIA MICROCOS Linn.

97 HELICTERES ISORA Linn

98 HEMIDESMUS INDICUS R Br.

*99 HIBISCUS CANNABINUS Linn., (S -Nali, H -Patsan, Bo -Ambari); generally cultivated.

100 HOLARRHENA ANTIDYSENTERICA Wall.

101. HOLARRHENA MITIS R Br (Sinhalese-kiriwolla), endemic in Ceylon

102. *HYDROCOTYLE JAVANICA Thunb

*103 HYPERICUM JAPONICUM Thunb, Khasia Hills, Assam, E & W. Peninsula

*104 INDIGOFERA OBLONGIFOLIA Forsk., (S -Jhilla), throughout the Indian plains, Baluchistan

*105 IXORA NIGRICANS Br, (Tam -Mashagani), E. & W. Indian Peninsula

*106 JATEORHIZA PALMATA (Lam) Miers, (Bo -Colombo, Tam -Kolumbu) cultivated in some parts of India

107 JATROPHA CURCAS Linn

108 JUGLANS REGIA Linn

*109 JUSSIAEA SUFFRUTICOSA Linn (S -Bhallava-anga, H -Banlaunga); throughout India

*110 JUSTICIA GENDARUSSA Burm (S -Nila-nirgundi, H -Nili-nargandi), cultivated throughout India

*111 LEEA INDICA Merrill, (H & B -Kakurjiwan, Bo -Karkani), throughout India, Andamans

*112 LENS CULINARIS Medic Syn.—*L esculenta* Moench, (B -Masuri, H. & S -Masur), cold weather crop throughout India

113 LITSEA CHINENSIS Lam

114 LUFFA ACUTANGULA var *amara* Clarke

*115 MALVA ROTUNDIFOLIA Linn, (H & Bo -Khubazi), Sind, Baluchistan, Wazirstan, plains of N India, ascending to 10,000 ft, Kumaon.

*116 MANGIFERA INDICA Linn, (H B & Bo -Amb, S -Amva), indigenous in Sikim, Assam, Khasia hills, Khandesh, along the W. Ghats, cultivated in the tropical regions

*117 MELASTOMA MALABATHRICUM Linn, Burma Myetpye, Tel -Pattudu), throughout India except the Desert

*118. MENTHA LONGIFOLIA Hunds Syn – *M -sylvestris* Linn. (Bo, H & S - Pudina), W. Himalaya, 4,000 to 12,000 ft

*119 MESUA FERREA Linn (S, H. & B -Nagkeshar, Bo -Nagchampa), Mountains of E Himalaya & E Bengal, Assam, ever green rain forests of N. Kanara & S. Konkan, forests of W Ghats, Andamans.

*120. MIMOSA PUDICA Linn.; (S -Lajja, H. & Bo.-Lajalu); naturalized more or less throughout India

*121. MIMUSSOPS ELENGI Linn., (S , H & B -Bakul Bo -Borasali), Andamans, W Peninsula, Khandala Ghats, Circars

*122 MORINDA CITRIFOLIA Linn , (H & B -Ach, Bo-Aal), indigenous in the Darjeeling Terai and Andamans and along the Konkan coast, cultivated largely in India

*123 MORINDA UMBELLATA Linn., (Bo -Al, S -Pitadaru), Khasia, hills, Madras State, E Ghats , W Ghats

124 MUSA SAPIENTUM O Kuntze

*125 MUCUNA PRURITA Hook , (S -Atmagupta, H -Kiwach), Punjab plain, from base of Himalayas to Ceylon & Burma.

*126 MURRAYA KOENIGII Spreng , (S -Sourabhi nimba, H -Katnim), Konkan, W Ghats, Deccan, S M Country, Madras State, along the foot of Himalaya from Kumaon to Sikkim, upto 5,000 ft., Bengal

*127 MURRAYA PANICULATA Jack, (H Marchula, B -Kamini), outer Himalaya from the Jumna eastwards, ascending to 4,500 ft , Assam Satpura Range, Peninsula

128. MYRICA NAGI Thunb , (S -Katphala, H , B & Bo -Kaiphal)

*129 MYRTUS COMMUNIS Linn , (H -Vilayiti mehdi, B -Sutr-sowa), indigenous from the Mediterranean to N W Himalaya, gardens, throughout India

*130 NANNORHOPS RITCHIEANA H Wendl , (H Mazri), Punjab, Sind, Waziristan, Baluchistan

*131 NEPETA ELLIPTICA Royle ex Benth , (P -Tukhmalanga), W. temperate Himalaya, from Kashmir to Garhwal, 6,000 to 8,000 ft.

*132 NYMPHAEA ALBA Linn , (Kash -Brimposh, Bo -Pandharen-kamal), Kashmir lakes

*133 NYMPHAEA PUBESCENS Willd , (M -Alli), all over India in the warmer parts

*134 OCIMUM AMERICANUM Linn Syn -*O canum* Sims , (H. & B.-Kala tulshi), plains and lower hills of India

*135 OCIMUM BASILICUM Linn , (S -Munjariki), indigenous on the lower hills of the Punjab, cultivated throughout the greater parts of India

136 OLDEN LANDIA AURICULARIA K Schum.

*137. OROXYLUM INDICUM Vent , (S.-Syonaka, H -Arlu, B - Sona), throughout India, except in the Western drier area

*138. OXALIS CORNICULATA Linn., (S -Amlika, H. & B -Amrul); nearly all regions throughout the warmer parts of India, in the Himalayas upto 8,000 ft.

*139. PAVONIA ODORATA Willd., (S.-Harivera, B.-Bala, Bo.-Kala vala) N. W. India Bundelkhand, Sind, Baluchistan, Rajasthan, Bengal, Konkan, S. M. Country, Deccan

140 · PEUCEDANUM GRAVEOLENS Benth

141. PHASEOLUS TRILOBUS Ait

*142. PHYLLANTHUS EMBLICA Linn., (S.-Dhatriphala, H.-Aoula, Bo. Amla), throughout tropical India, wild or planted

*143. PHYLLANTHUS NIRURI Linn., (S.-Bhumya-amalaki, H.-Jar-amla), throughout the hotter parts of India from the Punjab to Assam and southwards to Travancore

144 PHYLLANTHUS URINARIA Linn

145 PIPER LONGUM Linn

*146. PIPER NIGRUM Linn., (S.-Maricha, H.-Golmirch, B.-Golmarich), cultivated in hot damp parts of India

147 PISTACIA INTEGERRIMA Stew

148 PISTIA STRATIOTES Linn

*149 PLANTAGO CILIATA Desf., Punjab hills, Sind, Baluchistan

150 PLANTAGO MAJOR Linn.

151. PLANTAGO OVATA Forsk

*152 PLATANUS ORIENTALIS Linn (P. & Kash.-Buin), N. W. Himalaya, 5,000 to 8,000 ft., cultivated only

153 PLUMBAGO ZEYLANICA Linn

154 PSIDIUM GUAJAVA Linn

*155. PULICARIA DYSENTERICA Gaertn Kashmir at 5,000-6,000 ft

*156 PUNICA GRANATUM Linn., (S.-Darimba, H.-Anar) wild in Salt range and in the Himalayas from 3,000 to 6,000 ft., also cultivated in many parts of India.

157 RHEUM EMODI Wall

*158 RUBIA CORDIFOLIA Linn., (S. & B.-Manjistha, H.-Manith, Bo.-Manjit), throughout India in hilly districts

*159 RUMEX SCUTATUS Linn., (English-French sorrel), W. Himalaya

*160. RUMEX VASICARIUS Linn., (S.-Chukra, H., B. & Bo.-Chuka), indigenous to W. Punjab, the Salt Range & Trans-Indus Hills, also cultivated.

*161. SALIX ALBA Linn., (P.-Bis, Kash.-Vuir), cultivated in N. W. Himalaya

162 SAPINDUS TRIFOLIATUS Linn.

163. SARACA INDICA Linn.

*164. SCINDAPUS OFFICINALIS Schott., (H. & B.-Gajapipal. Bo.-Thora-pimple), from Sikkim eastwards, Bengal, Chittagong, Andamans.

165. SEMECARPUS ANACARDIUM Linn f

*166. SHOREA ROBUSTA Gaertn f, (S, H, B & Bo Sal), Punjab, along the Sub-Himalayan tract to Assam, Garo Hills, Orissa, Khasia hills, Jaintia hills, Madhya Pradesh

*167. SIDA SPINOSA Linn.; (S-Nagabala, H-Gulsakari, B-Bonmethi), throughout the hotter parts of India from N W. India to Ceylon.

*168. SMILAX PROLIFERA Roxb., (H-Ram dataum), Kumaon, Nepal Sylhet, Bengal, Bihar, Deccan, Peninsula

*169. SOLANUM NIGRUM Linn, (S & B-Kakmachi, Bo-Mako), throughout India, upto 9,000 ft in the W Himalayas

*170. SOYMIDA FEBRIFUGA A Juss, (S Rohuna, H, B & Bo-Rohan), dry forests of W Peninsula extending to Merwar & Chota Nagpur

*171 SPILANTHES ACMELLA Murr, (Bo & P-Akarkara), throughout India, upto 5,000 ft in the Himalayas & other mountains

*172. STACHYTARPHETA JAMAICENSIS Vahl var *indica* Lam Syn—*S indica* Vahl, (M-Simainayuruvi), tropical India from the Punjab & Sylhet to Travancore

173 STRYCHNOS NUX-VOMICA Linn

174 SYMPLOCOS RACEMOSA Roxb

*175 SYZYGIUM CUMINI (Linn) Skeels Syn—*Eugenia jambolana* Lam, (H & B-Jam), throughout India

*176 SYZYGIUM JAMBOS (Linn) Alst Syn—*Eugenia jambos* Linn, (H & Bo-Gulabjaman), Sikkim Terai

*177 SYZYGIUM OPERCULATUM Gamble, Syn—*Eugenia operculata* Roxb, (H-Rai-jaman, S-Bhumbi jambu), sub-Himalayan tract, common in Savannahs in Sal forests, Bihar, Assam, Sylhet, Chittagong

*178 TECTONA GRANDIS Linn f, (S-Saka, H & B-Segun), Konkan, W Ghats of Bombay & Madras States, Deccan, Carnatic, Madhya Bharat, Circars.

179. TERMINALIA ARJUNA W & A

180 TERMINALIA CHEBULA Retz

181. TERMINALIA CITRINA Fleming

*182 TRIUMPHETA BARTRAMIA Linn, (H-Chikti, B-Bun-akora), throughout tropical & sub-tropical India, ascending to 4,000, ft in the Himalaya

183 TYLOPHORA ASTHMATICA Wight & Arn.

*184. TYPHA ELEPHANTINA Roxb., (B-Hegla, Bo-Ramban, Kash-Pitz), marshes from N. W. India to Assam & Southwards, Indus Delta.

*185 URARIA LAGOPOIDES DC, (Bo.-Dowla, H. Pithvan); Tropical zone, Nepal, Chota Nagpur Bengal to Ava.

186 VATERIA INDICA Linn

'187 WOODFORDIA FRUTICOSA Kurz, (S -Dhataki, H & B -Dhai), throughout India, Baluchistan

'188 WRIGHTIA TINCTORIA R Br, (S -Asita kutanja, H -Mitha indarjou, Bo -Indrajau), Rajasthan, Madhya Pradesh, Deccan, Konkan, S M Country, Circars, W Ghats of Madras State

Indian Plants considered to be Useful in Cholera and Prolonged Fevers such as the Enteric Group

1 ACONITUM FEROX Wall

*2 ARTABOTRYS SUAVEOLENS Blume, Chittagong, Sylhet

*3. BLUMEA LACERA DC, (B —Kukursunga, Bo —Nimrudi), throughout plains of India, upto 2,000 ft

*4 CAPPARIS ZEYLANICA Linn, (H -Ardanda, B -Kalu-kera), Indian gardens

*5 CAPSICUM FRUTESCENS Linn Syn.-*C minimum* Roxb, cultivated, but not extensively

*6 CARAPA MOLUCCENSIS Lam, (B -Pussar), Littoral forests of Bengal and Andamans

7 CASSIA ANGUSTIFOLIA Vahl

*8. DESMODIUM GANGETICUM DC (S & Bo -Shal Parni, H -Sarivan), outer himalayas and throughout India

*9 DRYNARIA QUERCIFOLIA J Sm (Bo -Basingh, S -Ashvakatri), throughout plains of India, on trees or rocks

*10. ELAEOCARPUS TUBERCULATUS Roxb (S Rudraksha, M -Rutthrakṣham), Western Indian Peninsula

*11. ERYCIBE PANICULATA Roxb, (Santh -Kari, Tam -Unankodi), throughout India

*12. ERYTHROXYLUM MONOGYNUM Roxb (M Devadarum), Madras, N Circars dry evergreen forests of Deccan and Carnatic, W Ghats, dry hill forests of Travancore

13 EUPHORBIA HELIOSCOPIA Linn

*14. FAGONIA CRETICA Linn. (H -Damahan, P -Dama); Deccan, W Khandesḥ, Cutch, Sind, Baluchistan, Wazirstan, W Rajasthan, Upper gangetic plain, Punjab

*15. FLACOURTIA INDICA Merr Syn -*F ramontchi* L' Herit, (B Bincha); Sub-Himalayan tract, Upper Gangetic Plain, common in Peninsula, W. Ghats, Forests of the N Circars and Deccan upto 3,000 ft

*16. GREWIA HIRUSTA Vahl. Symb (Bo -Gowali H Kukarbicha), Sub-Himalayan tract upto 4,500 ft. from the Indus eastwards, Salt Range, Bihar, Orissa.

*17 GREWIA MICROCOS Linn (M -Kottei), E. Bengal, Assam, W. Peninsula, Mysore.

18. KALANCHOE SPATHULATA DC.

*19 LODOICEA MALDIVICA Pers. Syn -*L seychellarum* Labill. (H & Bo-Darya-kanariyal), cultivated in India

*20 MARRUBIUM VULGARE Linn, (H -Pahari gandana), Kashmir from 5,000 to 8,000 ft Baluchistan etc.

*21. MOMORDICA CHARANTIA Linn. (H -Karela, B -Karala, Bo -Karla), cultivated throughout India

*22. MUSA PARADISIACA Linn var *sapientum* Kuntze Syn -*M sapientum* Linn. (S -Ramoha, H & Bo -Kela), commonly cultivated.

*23. OLDENLANDIA AURICULARIA K Schum, (B -Muttia-lata, Bo.-Dapoli), almost all over India

*24 POINCIANA PULCHERIMA Linn Syn -*Caesalpinia pulcherima* Swartz (B -Krishnachura, S & Tam -Ratna-gandhi), Gardens throughout India.

*25. PSIDIUM GUAJAVA Linn. (H -Amrud, Bo -Perala), cultivated & naturalized throughout India

26. SAPINDUS TRIFOLIATUS Linn

27 SCHLEICHERA OLEOSA (Lour) Merr Syn -*S trijuga* Willd

*28 SCHWEINFURTHIA SPHEROCARPA Br, (S H & Bo -Sanipat), Rajasthan Desert, Sind, Baluchistan

*29 SOLANUM MELONGENA Linn, (S.-Bartaku, H -Baigun), widely cultivated in India

* 30. SOPHORA TOMENTOSA Linn, (Burm -Thimbawmagyi), Andaman & Nicobar Islands, very occasionally in Indian gardens.

31. STYRCHNOS NUX-VOMICA Linn

32 TERMINALIA CHEBULA Retz.

*33 TERMINALIA CITRINA Fleming, (H -Harira, B -Haritaki), Assam, Dacca, Mymensingh

*34 TERMINALIA PANICULATA Roth, (Bo -Kindal, M -Pekarakai; Western regions of the Peninsula from Bombay through Kanara & Malabar to Travancore, upto 2,000 ft., Coorg, Nilgiris, Anamalais Cuddapah, Ballary

35 TRACHYSPERMUM AMMI (Linn) Sprague, Syn.-*Carum copticum* Benth.

*36. ZANTHOXYLUM BUDRUNGA Wall., (Bazinali, Bo -Tessul, H -Badrang), Konkan, Deccan, S. M. Country, N Kanara, W Ghats in S Kanara, Mysore, Malabar, Annamalais and Travancore at low elevations, Orissa, Sylhet, Khasia Hills, Chittagong.

Indian Plants considered to have Emmenagogue and Abortifacient Properties

1. ABRUS PRECATORIUS Linn.
2. ALOE BARBADENSIS Mill.
3 ANANAS COMOSUS Linn
4. ANNONA SQUAMOSA Linn.
5. APIUM GRAVEOLENS Linn.
6. ARECA CATECHU Linn
7 ARISTOLOCHIA BRACTEATA Retz.
8 ARISTOLOCHIA INDICA Linn
9. ARTEMISIA VULGARIS Linn.
10 CALOTROPIS GIGANTEA (Linn.) Dryand (*C gigantea* R Br)
11. CALOTROPIS PROCERA (Linn) Dryand (*C. procera* R. Br.)
12. CARICA PAPAYA Linn.
13 CELASTRUS PANICULATUS Willd
14 CINCHONA CALISAYA Wedd
15 CINNAMOMUM CAMPHORA Nees & Eberm
16 CITRULLUS COLOCYNTHIS Schrid
17 CROCUS SATIVUS Linn
18 CUCUMIS TRIGONUS Roxb.
19 CUSCUTA REFLEXA Roxb.
20 DAUCUS CAROTA Linn.
21. DOLICHANDRONE FALCATA Seem.
22. EUPHORBIA TIRUCALLI Linn.
23 EXCOECARIA AGALLOCHA Linn.
24 GARCINIA MORELLA Desr.
25 GLORIOSA SUPERBA Linn.
26. GOSSYPIUM HERBACEUM Linn.
*27 LEPIDIUM SATIVUM Linn , (S -Chandrasuru, H -Chansaur, B -Halim), cultivated throughout India.
28. MOMORDICA CHARANTIA Linn.
*29. MOMORDICA TUBEROSA Cogn. (*M cymbalaria* Fenzl ex Naud), Bo.-Kadavanchi), Western parts of India
30. MORINGA OLEIFERA Lam. (*M. pterygosperma* Geratn.)
31. NERIUM INDICUM Mill. (*N. odorum* Soland.)

32 NIGELLA SATIVA Linn.

33 PEGANUM HARMALA Linn.

34. PLUMBAGO INDICA Linn (*P rosea* Linn)

35. PLUMBAGO ZEYLANICA Linn

*36. PLUMERIA RUBRA Linn var *acutifolia* Bailey (*P acutifolia* Poir, *P. acuminata* Ait), (S -Kahira champa, H & Bo -Khair champa), cultivated throughout India, naturalized in many parts

37 RANDIA DUMETORUM Lam

38. RUBUS MOLUCCANUS Linn

39 RUTA GRAVEOLENS Linn

40 SALICORNIA BRACHIATA Roxb

41 SAPINDUS TRIFOLIATUS Linn

42 SEMECARPUS ANACARDIUM Linn f.

43 SESAMUM ORIENTALE Linn (*S. indicum* Linn)

44 STACHYTARPHETA JAMAICENSIS (Linn), Vahl var *indica* H J. Lam. (*S. indica* Vahl)

45. TAXUS BACCATA Linn

46. THEVETIA PERUVIANA (Pers) Merr (*T. neriifolia* Juss ex Steud).

47. TRIANTHEMA PENTANDRA Linn

48 TRIANTHEMA PORTULACASTRUM Linn (*T monogyna* Linn)

*49 URENA LOBATA Linn (H -Bachata, B -Bonokra), hotter parts of India, a weed of waste places, forest clearing and roadsides, common in bambo and mango clumps of Bengal

50 WITHANIA somnifera Dun

Indian Plants liable to produce Dermatitis

1 ABROMA AUGUSTA Linn

2 AILANTHUS ALTISSIMA (Mill) Swingle (Syn *A glandulosa* Desf)

3 ANACARDIUM OCCIDENTALE Linn.

4 ANAGALLIS ARVENSIS Linn.

5 ANTHEMIS COTULA Linn.

6 APIUM GRAVEOLENS Linn

7 ARISAEMA SPECIOSUM (Wall.) Mart.

*8 ARISAEMA TORTUOSUM (Wall.) Schott , (P.-Don, Nep -Birbanka), from Simla to Sikkim & Bhutan at 8,000 ft , Khasia hills, Manipur, Ranchi, W Ghats

*9. ASPARAGUS OFFICINALIS Linn., (P , H. & Kash.-Allipalli), from Kashmir to Bhutan, Khasia Hills, Assam.

10. CALOTROPIS GIGANTEA (Linn) Dryand.

11. CALOTROPIS PROCERA (Linn) Dryand.

12 CANNABIS SATIVA Linn

*13. CISSUS SETOSA Roxb , (H -Karmal, Bo -Khaj-goli-cha-vel), Deccan, W. Ghats of Madras State

14 DATURA STRAMONIUM Linn

15. DAUCUS CAROTA Linn

*16. DELPHINIUM AJACIS Linn., commonly cultivated in gardens.

*17. DICTAMNUS ALBUS Linn , from Kashmir to Kunawar.

18 ERIGERON CANADENSIS Linn

19 EUPHORBIA ACAULIS Roxb

20. EUPHORBIA ANTIQUORUM Linn.

21 EUPHORBIA CATTIMANDO W Elliot (*E trigona* Fl. Brit. Ind. in part)

22. EUPHORBIA HELIOSCOPIA Linn

23. EUPHORBIA NERIIFOLIA Linn.

24 EUPHORBIA NIVULEA Buch Ham.

25. EUPHORBIA PEPLUS Linn

26 EUPHORBIA ROTHIANA Spreng.

27 EUPHORBIA ROYLEANA Boiss

*28 EUPHORBIA THOMSONIANA Boiss , (Kash -Hirtiz), Kashmir 10,000 to 12,000 ft.

29. EUPHORBIA TIRUCALLI Linn

30 EUPHORBIA TRIGONA Haw

31 EXCOECARIA AGALLOCHA Linn.

32 FAGOPYRUM ESCULENTUM Moench.

33 FLEURYA INTERRUPTA Gaudich.

*34. GINKGO BILOBA Linn., (English-Maiden-hair-tree), rarely cultivated in gardens

*35 GIRARDINIA HETEROPHYLLA Decne., Mount Abu, Chota Nagpur, W Peninsula.

36. HEDERA HELIX Linn.

*37. HIPPOMANE MANCINELLA Linn , (English-Manchineal tree), introduced into Indian gardens.

38. HOLIGARNA ARNOTTIANA Hook. f.

39. HOLIGARNA GRAHAMII (Wight) Hook. f.

40. HOLIGARNA LONGIFOLIA Buch. Ham ex. Roxb.

41. HUMULUS LUPULUS Linn

42. HYPERICUM PERFORATUM Linn

43. LAPORTEA CRENULATA Gaudich

*44. LAPORTEA TERMINALIS Wight, sub-tropical Himalayas from Kumaon to Mishmi at 4,000 to 8,000 ft., Madhya Pradesh, W Ghats of Madras State.

*45. LASIOSIPHON ERIOCEPHALUS Decne, (Bo-Rametha) W Ghats of Bombay and Madras States also Nilgiris

*46 LEONURUS CARDIACA Linn, Kumaon, Kashmir, Hazara, Kurrum valley.

*47. LOBELIA EXCELSA Lesch, W Ghats of S India, Nilgiris, Pulney, Travancore above 6,000 ft

*48 LOBELIA NICOTIANIFOLIA Heyne (B & H-Nala, Bo-Dhavala), W. Ghats from Bombay to Travancore at 3,000 to 7,000 ft., Konkan, Deccan, Nilgiris, Malabar

*49. MUCUNA ATROPURPUREA DC, plains of Western India

*50, MUCUNA GIGANTEA DC, (Malay-Kaku-vali), a littoral species found on the Indian Coast

*51. MUCUNA HIRSUTA Wight & Arn, plains of Western India.

*52. MUCUNA MONOSPERMA DC, (Bo, Sonogaravi, M-Thelu-Kodi), E Himalaya, Khasia Hills, Assam, Chittagong, Konkan, S M Country.

53. MUCUNA PRURITA Hook. (*M pruriens* Fl. Brit Ind., non DC.)

54. NERIUM OLEANDER Linn.

55. PODOPHYLLUM HEXANDRUM Royle (Syn — *P. emodi* Wall. ex. Hook, f & Thoms)

56. POLYGONUM HYDROPIPER Linn.

57. RANUNCULUS SCELERATUS Linn.

58 RHUS INSIGNIS Hook. f.

59 RHUS PUNJABENSIS J. L. Stew ex Brand.

60. RHUS SUCCEDANEA Linn.

61. RHUS WALLICHII Hook. f.

62. RUMEX ACETOSA Linn.

63. RUMEX ACETOSELLA Linn

*64. RUTA GRAVEOLENS Linn,, var *angustifolia* Hook. f, (S-Somalata, H.-Gadab, B.-Ermul, Bo.-Satap), cultivated in Indian gardens.

65. SAPIUM INSIGNE Trimen.

66. SCHIMA WALLICHII Choisy
67. SEMECARPUS ANACARDIUM Linn f
68. SEMECARPUS TRAVANCORICUS Bedd
69. TRAGIA BICOLOR Miq
70 TRAGIA INVOLUCRATA Linn
71 URTICA DIOICA Linn
72. URTICA HYPERBOREA Jacq.
73 URTICA PARVIFLORA Roxb
74 URTICA PILULIFERA Linn.
75 WALLICHIA DISTICHA T. Anders
76. XANTHIUM STRUMARIUM Linn

Indian Plants considered to have Insecticidal & Piscicidal Properties.

1 ACACIA PENNATA (Linn) Willd
2. ACORUS CALAMUS Linn
*3 ACORUS GRAMINEUS Soland, Sikkim Himalaya upto 6,000 ft , Khasia hills 4,000-5,000 ft
4 ACRONYCHIA PEDUNCULATA (Linn) Miq (Syn —*A laurifolia* Blume).
5 ADINA CORDIFOLIA (Roxb) Benth & Hook f.
6 AGAVA AMERICANA Linn.
*7 ALBIZZIA CHINENSIS (Osbeck) Merr (Syn -*A stipulata* Boiv), (B.- Amluki, Bo.-Udala), throughout India, ascending to 4,000 ft. in the Himalaya
8 ALBIZZIA PROCERA (Roxb.) Benth.
9 ANACARDIUM OCCIDENTALE Linn
10 ANAGALLIS ARVENSIS Linn
11 ANAMIRTA COCCULUS (Linn.) Wight & Arn.
12 ANDRACHNE CORDIFOLIA Muell Arg.
13 ANNONA RETICULATA Linn.
14. ANNONA SQUAMOSA Linn
*15. APAMA TOMENTOSA Engl (Syn -*Bragantia tomentosa* Blume); Assam & Manipur.
16 ARENGA OBTUSIFOLIA Mart
17. ARISAEMA SPECIOSUM (Wall.) Mart.
18. ARISAEMA TORTUOSUM (Wall.) Schott.

19. ARISTOLOCHIA BRACTEATA Retz.

20. ARTEMISA ABSINTHIUM Linn.

21 ARTEMISIA VULGARIS Linn

22 ASCLEPIAS CURASSAVICA Linn

23 AZADIRACHTA INDICA A. Juss (Syn -*Melia azadirachta* Linn)

24 BALANITES AEGYPTIACA Delile (Syn -*B roxburghii* Planch)

25 BAMBUSA BAMBOS Druce (Syn -*B. arundinacea* Willd)

26 BARRINGTONIA ACUTANGULA (Linn) Gaertn

27 BARRINGTONIA ASIATICA (Linn) Kurz Syn *B speciosa* Forst)

*28. BARRINGTONIA RACEMOSA (Linn) Roxb , (S -Nipi, H -Ijjul), Western sea coast of India, from Konkan to Travancore, Assam, Sunderbans.

29. BERBERIS ARISTATA DC (possibly some other species of Berberis also)

30 BUTEA MONOSPERMA (Lam) Kuntze (Syn -*B frondosa* Koen ex Roxb.)

31 CAESALPINIA NUGA (Linn) Ait.

32 CALLICARPA LONGIFOLIA Lam. var. *lanceolaria* C B Clarke

33. CALONYCTION MURICATUM (Linn.) G Don (Syn -*Ipomoea muricata* Jacq)

34. CALOPHYLLUM INOPHYLLUM Linn

35 CANNABIS SATIVA Linn

*36. CARDARIA DRABA Desv (Syn -*Lepidium draba* Linn.), (Afgh -Bijindak) a weed of cultivation in the Punjab & N W. Frontier Pakistan

37 CAREYA ARBOREA Roxb

38. CASEARIA GRAVEOLENS Dalz

*39 CASEARIA TOMENTOSA Roxb., (H & Bo -Chillara), throughout India, ascending to 3,000 ft in Himalayas

40 CASSYTHA FILIFORMIS Linn

41 CENTRATHERUM ANTHELMINTICUM (Willd) Kuntze (Syn.-*Vernonia anthelmintica* Willd)

42 CERBERA MANGHAS Linn. (Syn -*C. odollam* Gaertn.)

43. CHRYSANTHEMUM CINERARIAEFOLIUM Vis.

44. CHRYSANTHEMUM COCCINEUM Willd.

45 CIMICIFUGA FOETIDA Linn.

46. CINCHONA CALISAYA Wedd.

47. CINCHONA OFFICINALIS Linn.

48. CINCHONA SUCCIRUBRA Pav. ex Klotzsch.

49 CINNAMOMUM CAMPHORA Nees & Eberm.

50 CLEISTANTHUS COLLINUS Benth. & Hook f

51. CORYPHA UMBRACULIFERA Linn.

52 CROTON OBLONGIFOLIUS Roxb.

53 CROTON TIGLIUM Linn

54 CUCUMIS SATIVUS Linn

55 CURCUMA LONGA Roxb

*56 CYMBOPOGON NARDUS (Linn) Rendle (Syn -*Androp on nardus* Linn) (Bo -Kamkher, H -Ganjni), throughout the hotter parts, wild or cultivated

57 CYNANCHUM ARNOTTIANUM Wight

58 DALBERGIA STIPULACEA Roxb.

59 DELPHINIUM BRUNONIANUM Royle

60. DELPHINIUM CAERULEUM Jacquem ex Cambess

61 DELPHINIUM ELATUM Linn.

62 DERRIS ELLIPTICA (Roxb) Benth

63 DERRIS FERRUGINEA (Roxb.) Benth

64 DERRIS SCANDENS (Roxb.) Benth

*65 DERRIS TRIFOLIATA Lour , var *uliginosa* (Roxb ex Willd) (Syn - *D uliginosa* Benth , *Robinia uliginosa* Roxb ex Willd)

66 DIOSCOREA HISPIDA Dennst (Syn -*D. daemona* Roxb)

67 DIOSCOREA PRAZERI Prain, Burkill (Syn -*D deltoidea* Wall , var sikkimensis Prain)

68 DIOSPYROS EBENUM Koen

*69 DIOSPYROS MONTANA Roxb , (S -Tumala, H -Lohori, B -Bangab), throughout India, from Kanara eastwards in the sub-Himalayan tract

*70 DIOSPYROS PANICULATA Dalz , (S -Thinduka, M -Karinthuvari), S M Country, Travancore, Kanara, Malabar

71 DODONAEA VISCOSA (Linn) Jacq

72 DOLICHANDRONE FALCATA Seem

73 DURANTA REPENS Linn. (Syn.-*D plumieri* Jacq)

74. EDGEWORTHIA GARDNERI Meissn

75. ENTADA PURSAETHA DC (Syn -*E. scandens* Benth)

*76 EREMOSTACHYS SUPERBA Royle ex Benth., W. Himalaya, Punjab, Garhwal.

77. EREMOSTACHYS VICARYI Benth

78. EUCALYPTUS GLOBULUS Labill

79 EUPATORIUM ODORATUM Linn

80 EUPHORBIA ANTIQUORUM Linn

81 EUPHORBIA NERIIFOLIA Linn

82. EUPHORBIA ROYLEANA Boiss

83. EUPHORBIA THYMIFOLIA Linn.

84. EUPHORBIA TIRUCALLI Linn

85. EXCOECARIA AGALLOCHA Linn

86. FLUGGEA LEUCOPHYRUS (Koen) Willd

87 FLUGGEA VIROSA (Roxb. ex Willd) Baill. (Syn -*F. microcarpa* Blume)

*88. GARDENIA CAMPANULATA Roxb , (Burm -Hsathanpaya), foot of Sikkim Himalaya, Assam, Sylhet, Chittagong, Bihar.

89 GAULTHERIA FRAGRANTISSIMA Wall

90 GLORIOSA SUPERBA Linn

91. GNETUM SCANDENS Roxb.

92 GYNANDROPSIS GYNANDRA (Linn) Merr. (Syn.-*G pentaphylla* DC.)

93 GYNOCARDIA ODORATA R Br

94 HARPULLIA CUPANIOIDES Roxb.

95 HEDERA HELIX Linn

96. HYDNOCARPUS KURZII (King) Warb (Syn -*Taraktongenos kurzii* King)

97. HYDNOCARPUS LAURIFOLIA (Dennst) Sleumer (Syn -*H wightiana* Blume)

98 HYDROCOTYLE JAVANICA Thunb

99 JATROPHA CURCAS Linn

100 JUGLANS REGIA Linn

101 KALANCHOE SPATHULATA (Poir) DC.

*102 LAGENANDRA TOXICARIA Dalz (Many authors view this species as synonymous with *L ovata* (Linn) Thw of Ceylon), (Bo Rakhalu, M -Maravara, Tsjmul), Konkan to N. Kanara, Travancore, Mysore, Coorg, Cochin

103 LASIOSIPHON ERIOCEPHALUS Dcne

*104. LINOSTOMA DECANDRUM Wall , Sylhet, Chittagong

105. MADHUCA LATIFOLIA (Roxb) Macbride (Syn -*Bassia latifolia* Roxb)

106 MADHUCA LONGIFOLIA (Linn.) Macbride (Syn.—*Bassia longifolia* Linn

107. MAESA INDICA Wall

108 MELALEUCA LEUCADENDRON Linn.

109 MELODINUM MONOGYNUS Roxb

110. MILLETTIA AURICULATA Baker ex Brand

*111 MILLETTIA PACHYCARPA Benth , forests of Garo & Khasia Hills, Sikkim & Assam upto 4,000 ft

*112 MILLETTIA PISCIDIA Wight & Arn , Sikkim and Assam

113 MUNDULEA SERICEA (Willd) Greenway (Syn —*M suberosa* Benth.)

114 MYRICA NAGI Thunb.

115 NICANDRA PHYSALOIDES Gaertn

116 NICOTIANA RUSTICA Linn.

117 NICOTIANA TABACUM Linn

118. NIGELLA SATIVA Linn

*119 OCIMUM GRATISSIMUM Linn , (S -Vantulshi, H & B -Ramtulshi); common wild plant in W India cultivated in gardens in Bengal, Nepal, Deccan Peninsula

120 OUGEINIA DALBERGIOIDES Benth

121 PACHYGONE OVATA (Poir) Miers ex Hook f & Thoms.

122. PEGANUM HARMALA Linn

123 PHYLLANTHUS URINARIA Linn

124 PICRASMA JAVANICA Blume, var *nepalensis* Badhwar nov comb. (Syn -*P nepalensis* Benn).

125. PIERIS OVALIFOLIA D Don

126. PITHECELLOBIUM BIGEMINUM Mart (Syn —*Pithecolobium bigeminum* Benth).

127. POGOSTEMON HEYNEANUS Benth (Syn -*P patchouli* Hook. f. in Fl. Brit -Ind , non. Pellet)

128 POLYGONUM FLACCIDUM Meissn

129 POLYGONUM HYDROPIPER Linn

130 PONGAMIA PINNATA Linn Merr (Syn.-*P glabra* Vent)

131 PYGEUM GARDNERI Hook. f., (Bo -Daka), W Ghats of Bombay & Madras States, hills of Travancore, Malabar, Nilgiris, Pulneys the Deccan.

132 RANDIA DUMETORUM Lam. (Split up into three species by Gamble)

133. RANDIA ULIGINOSA DC.

134. RAUWOLFIA SERPENTINA Benth ex Kurz

135 RHODODENDRON BARBATUM Wall ex G Don, (Nepl.-Guras), Kumaon to Bhutan at 8,000 to 12,000 ft., Sikkim

136 RHODODENDRON FALCONERI Hook f, (Nepl -Kurling), East Nepal to Bhutan at 9,000 13,0000 ft

137 RICINUS COMMUNIS Linn.

138 RUTA GRAVEOLENS Linn. var *angustifolia* Hook f

139 SANTALUM ALBUM Linn

140 SAPINDUS MUKOROSSI Gaertn, (S -Phenila, H, B & Bo -Ritha) cultivated throughout N W India, Bengal & Assam, wild on the Himalayas upto 4,000 ft

141 SAPINDUS TRIFOLIATUS Linn

142 SAPIUM INDICUM Willd

143. SARCOSTEMMA ACIDUM (Roxb) Voigt (Syn -*S brevistigma* Wight & Arn)

144 SAUSSUREA LAPPA C. B Clarke

145 SCHLEICHERA OLEOSA (Lour) Merr (Syn -*S trijuga* Willd)

146 SCLERIA PERGRACILIS (Nees) Kunth widely scattered from Garhwal at 5,000 ft to Assam, Bihar, Chota Nagpur & Deccan

147 SOPHORA MOLLIS R Grah, (P -Buna, Arab -Arghavan), plains and low hills of the North-West, Hazara & the Salt Range to Kumaon & Nepal, upto 7,000 ft., & Bushahr & near Dehra Dun

148 SPHAERANTHUS INDICUS Linn

149 STEPHANIA HERNANDIIFOLIA (Willd) Walp, (S -Vanatik-tika, B - Agnad), W & E. Coast, Dehra Dun, Biharam (Sikkim, Bengal, Assam, Cachar)

150. STRYCHNOS COLUBRINA Linn

151 STRYCHNOS NUX-VOMICA Linn

152. TAXUS BACCATA Linn.

153 TEPHROSIA CANDIDA (Roxb) DC

154 TEPHROSIA PURPUREA (Linn) Pers

*155 TEPHROSIA VOGELII Hook f, cultivated by tea planters in Assam

156 TERMINALIA BELLERICA (Gaertn) Roxb.

157. THEVETIA PERUVIANA (Pers) Merr (Syn -*T nereifolia* Juss ex. Steud)

*158 TRIGONELLA FOENUM-GRAECUM Linn, (H B & Bo -Methi), Punjab & Kashmir, cultivated in many parts of India

159. VERBASCUM THAPSUS Linn

*160 VITEX NEGUNDO Linn, (S. & H -Nirgundhi, B -Nishinda), throughout India in the warmer zone

161 WALSURA PISCIDIA Roxb

162 WIKSTROEMIA INDICA (Linn) C. A Mey var. *viridiflora* (Meissn) Hook f.

163. ZANTHOXYLUM ALATUM Roxb

*164 ZANTHOXYLUM HAMILEONIANUM Wall, (Nep -Purpuray timur), throughout Assam, in low level forests, except in the Khasia and Jaintia hills

CHAPTER X

Bibliography

In the first edition of The Review, a list of the papers published on the subject under the Indian Council of Medical Research (formerly Indian Research Fund Association) was given As the scope of the present review has been widened to include all the work done on Indian Indigenous Drugs anywhere, the question of including a comprehensive and if possible a complete bibliography for the new edition was discussed and agreed to by the Secretary Indian Council of Medical Research. In view of the fact that no such bibliography has so far been published and also because this subject has been assuming increased importance both in India and abroad, it was decided that a comprehensive bibliography should form a particular feature of the present edition, inspite of the fact that size of volume would be considerably increased

During the last 3 or 4 decades the subject of Indian Indigenous Drugs has received considerable attention of many of the scientific workers in this country and their papers have been published in various journals in India and elsewhere. The subject has interested many foreign workers also who have made very important contributions in foreign scientific journals An attempt has been made to get all the references together, particularly of the work done on the plants of Indian origin. This is a special feature of the bibliography which is given in this Chapter

To facilitate consultation by workers references have been arranged plant-wise (which are given in alphabetical order,) and in sequence of years in which the papers have been published In order to attract the immediate attention of the workers the un-orthodox method of giving the title of the paper first and names of authors afterwards has been adopted

Abbreviations of the journals used are also given in a separate list

The inclusion of all the available bibliography in the present volume has involved considerable labour and careful sifting It is hoped that it will be useful to those who wish to consult the previous work done when taking up a plant for investigation It is by no means such an exhaustive bibliography as we would have wished but it is hoped that it may serve as a first compilation of its kind which can be gradually added to.

List of Journals and Books with the Abbreviations.

Agri Jr Ind	.	Agricultural Journal of India
Agri Ledger	. .	Agricultural Ledger (Govt of India)
Amer Chem Jr	..	American Chemical Journal
Amer Jr. Pharm	...	American Journal of Pharmacy.
Analyst	...	Analyst.
Ann Bot.	...	Annals of Botany.

Ann. Chem. ...	Annalen der Chemie.
Ann Chim ...	Annales de Chemie
Ann Chim Phys ...	Annales de Chimie et de Physique
Ann Chim Appl ...	Annales de Chimie analytique appliquee
Ann. Inst Past ..	Annales de l' Institut Pasteur
Arch de Pharm. ..	Archiv de Pharmacie
Arch Exper Path Pharm	Archiv fur experimentelle Pathologie and Pharmakologie
Arch Hyg. ...	Archiv fur Hygiene
Arch Pharm .	Archiv der Pharmazie
Biochem d Pflzen ...	Biochemie der Pflanzen
Biochem Jr .	Biochemical Journal
Biochem Ztsche	Biochemische Zeitschrift.
B M J ...	British Medical Journal
Buchn Repert Pharm ...	Repertorium der Pharmacie (Buchner)
Bull Acad Sci Allahabad	Bulletin of the Academy of Science of Uttar Pradesh of Agra & Oudh, Allahabad
Bull Bot Gard Kew. ...	Bulletin Botanical Garden Kew
Bull Sc Pharm. ...	Bulletin des Sciences Pharmacologiques
Bull. Soc Chim ...	Bulletin de la Societe Chimique de France
Bull Soc Chim Biol ...	Bulletin de la Societe de Chimie Biologique
Bull Tokyo Inst Technical	Bulletin, Tokyo Institute of Technology
C C ...	Chemisches Centralblatt
Chem Abst ..	Chemical Abstract (American)
Chem Weekbl. ...	Chemisches Weekblad
Chem Ztg ...	Chemiker-Zeitung
Chin Jr Physiol ..	Chinese Journal of Physiology
Compt Rend ...	Comptes rendus hebd des Seances de l' Academie des Sciences
Comp Soc Biol ...	Comptes rendus hebd des Seances de la Societe de Biologie.
Curr Sci ...	Current Science
Helv. Chim Act. ...	Helvetica Chimica Acta
Ind Farming ...	Indian Farming
Ind. For Rec. ...	Indian Forest Records (and Bulletin) Dehra Dun
Ind. For. ...	Indian Forester
Ind. Jr. Agric Sci ...	Indian Journal of Agricultural Science

Ind. Jr. Ent. ...	Indian Journal of Entomology.
Ind. Jr. Med. & Phys Sc.	Indian Journal of Medical and Physical Science
I. J. M. R. ...	Indian Journal of Medical Research.
Ind. Jr. Pharm. ...	Indian Journal of Pharmacy
Ind Jr. Vetr Sci Animal Husbandry ...	Indian Journal of Veterinary Science & Animal Husbandry
I. M. G ...	Indian Medical Gazette.
I M J. ...	Indian Medical Journal
J C. S. ...	Journal of the Chemical Society, London.
Jr. Agri Res ...	Journal of Agricultural Research
Jahrb. Prakt Pharm ...	Jahrbuch fur Praktische Pharmazie
Jr. Amer Pharm. Assoc ...	Journal of the American Pharmaceutical Association
Jr Amer Chem Soc	Journal of the American Chemical Society
Jr Anamalai Univ	Journal of Anamalai University
Jr Assoc Agri Chem	Journal of the Association of Official Agricultural Chemists
Jr. Biol Chem ...	Journal of Biological Chemistry
Jr Bombay Nat Hist Soc	Journal of Bombay Natural History Society
Jr Pharm .	Journal der Pharmacie fur Aerzte
Jr Ind Chem Soc ..	Journal of the Indian Chemical Society
Jr Ind Inst Sci ..	Journal of the Indian Institute of Science, Bangalore
Jr Malaria Inst India .	Journal of the Malaria Institute of India
Jr Mysore Univ	Journal of the Mysore University
Jr Pharm Chim	Journal de Pharmacie et de Chimie
Jr Pharm Soc Japan	Journal of the Pharmaceutical Society of Japan.
Jr Pharm Exp Therap .	Journal of Pharmacology and Experimental Therapeutics.
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